



**Intel® PROSet/Wireless WiMAX Software
v6.5 PV Release Announcement
TIC #TRWXW0625G
VIP KIT #36286**

PCCG Wireless Marketing

WW26.5 - 2011

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Intel® PROSet/Wireless WiMAX Software

v6.5 PV Release

- WiMAX v6.5 PV Release Update
- v6.5 PV Content
- Issues/Bugs Fixed
- Updated Installation Guidelines

Intel® PROSet/Wireless WiMAX Software

v6.5 PV Release Update

- Release Updates:
 - HARQ (UL) on management
 - HARQ CAT 7 (DL)
 - HARQ CAT 6 (UL)
 - Host error handling and reporting
 - MVNO (Mobile Virtual NW Operator) re-connect – CLWR only
 - Realm Verification enablement
 - Enhanced Mobility
 - Basic LBS (Location Based Services) Support
 - Resource Retention Time utilization
 - Drop to non neighbor
 - VaTU tool update (GUI updates)

Program Milestone	Commit	Status
Beta	WW16 '11	Completed
Bug Cut-off	WW19 '11	Completed
PC	WW24 '11	Completed
PV	WW26 '11	Completed

Remark: VaTU not supporting XP 64 bit OS & VISTA 64 bit OS

Issues/Bugs Fixed

- DCRs and new additions:
 - YTL operator removal
- Select bug fixes coming from mainly:
 - WMF certification
 - Operators certification tests
 - Static analyzer fixes
 - Localization fixes
- Improved WiMAX driver responsiveness performance*

<i>Component</i>	<i>Parameter</i>	<i>v6.2</i>	<i>v6.5</i>
WiMAX driver (BPMP)	Device start (ms)	713	205
WiMAX driver (BPUSB)	Device Suspend (ms)	312	186

* as measured on a PineTrail SC 1.66GHz reference platform

Intel® PROSet/Wireless WiMAX Software

v6.5 PV Release

- WiMAX Software PV TIC: **TRWXW0625G (WiMAX_SW_6.5.1036) - Kit #36286**
- Supported Hardware:
 - Kilmer Peak (KP) / Kelsey Peak (KsP)
- Supported OS:
 - Microsoft® Windows Vista* 32/64 SP2
 - Microsoft® Windows XP* 32/64 SP3
 - Microsoft® Windows 7* 32/64
- Supported Operators (**YTL Operator is no longer supported**)
 - Clearwire (U.S), UQ (Japan), VMAX (Taiwan), Comstar (Russia), Packet-1 (Malaysia), FreshTel (Ukraine), U.S Mobile Virtual Network Operators (MVNO) - Sprint, Comcast, Time Warner, Vee (Taiwan), KT (South Korea), Imagine (Ireland), Linkem (Italy) and Aksoran (Kazakhstan).
- Platforms Tested On
 - Huron River (HRV)
 - Calpella
 - Menlow
 - OakTrail
 - PineTrail – Microsoft® Windows XP* and Microsoft® Windows 7* only

Supported Features – WiMAX Software*

Application

- WiMAX configuration Utility
 - CU UI enhancements
 - Robust Connect
- WiMAX API
- Network detection and Selection (ND&S)
 - Manual/Automatic scan and connect modes, wide scan
 - Detection, selection and connection
 - Detect and connect to recent NW
 - Recovery from link-down.
 - ND&S improvements
 - Scanning/Connection time optimizations
 - Preferred NSP
 - **MVNO Re-connect**
- OTAP (APDO)
 - NWG OTA spec using OMA-DM client
 - Online/offline activation.
 - Provisioning
 - Default WMF mode for NW connection

PHY features

- 10MHZ channel bandwidth, 1024 FFT.
- DL-QPSK/QAM16/QAM64, UL-QPSK/QAM16
- DL / UL ratio inside frame: 10Mhz, 35:12 / 32:15 / 29:18 / 26:21
- PUSC (Partial Usage of Sub Channels) permutation
- SPUSC (Segmented PUSC) - support for channel reuse1
- TPC - Open Loop & Close Loop TPC support.
- Link adaptation
- HARQ CAT 5
 - UL /DL for UQ
- **HARQ CAT 6 (UL)**
- **HARQ CAT 7 – Currently only available on UQ supported network configurations**
 - Throughput improvements of up to 28 Mbps (DL Only)
- Load Balancing (dependant on network implementation)
 - Frequency override
 - BS initiated HO
 - BS initiated Periodic Scan
 - Enabling MS Scan reports to BS
- DL MIMO support (matrix A and B) with dynamic mode selection.

MAC features

- Network Entry.
- Ranging & Bandwidth request
- Fragmentation and Packing
- ARQ (Automatic Repeat reQuest) support on DL & UL
- Mobility - Optimized Handover
 - Optimized neighbor scanning and selection
 - Low latency BS handover to support real time applications
 - HO neighbors specific triggers
- QoS –
 - BS initiated Service flow
 - Support for BE connections.
 - Improved QoS - UGS and ertPS (WMF certified, dependent on operator configuration)
- Security-
 - platform security – secured boot and production lock
 - EAP-TLS using device certificate
 - EAP TTLS
 - 802.16e PKMv2 security (CMAC, AES-CCM128, AES-key-wrap)
 - TEK refresh
 - **Realm Verification enablement**
- WiMAX Idle mode
 - Including BS initiated Idle
- WiMAX Sleep mode
- Expedited Network Re-entry
- **HARQ on management**
- **Enhanced Mobility**
 - **Basic LBS (Location Based Services) Support**
 - **Resource Retention Time utilization**
 - **Drop to non neighbor**
- Supported WiMAX Forum profiles
 - 3A, 1A/B, 5A/C, 5BL (for KP)
 - 3A, 1A/B (for KsP)

New features/updates

*Some WiMAX features are dependant on NW implementation & configuration

Test CAT Files Installation Guidelines

Test Signing

- Intel is aligning the test signing of our pre-release drivers to a Microsoft recommended standard. For this build, pre-release “.cat” files are signed with a certificate using an Equifax/Geotrust Root Certificate Authority.
- The Equifax/Geotrust root certificate is installed by default with all current versions of Microsoft Windows.
- As with previous releases, it is still necessary to put the machine into “Test Signing” mode prior to installing the driver on Windows Vista/7 Machines.
- You may encounter a prompt asking if you trust Intel Corporation as a trusted publisher when installing the driver software. To avoid this pop-up, it is necessary to add Intel Corporation to the Trusted Publisher Store.
 - Intel has included a package to help automate the installation of the certificate into the trusted publisher store. Download from VIP **Kit # 36286** Certificates.zip, and execute the install_cert.bat in a command prompt as the administrator user.
 - Note: Right clicking install_cert.bat and selecting “Run as administrator will not properly install the certificate into the trusted publisher store.
- Under Windows XP the certificate doesn't work because the certificate's purpose is only “Code Signing,” not for “Windows Hardware Driver Verification” purpose also, and therefore the drivers are considered not signed.
- On Windows XP to disable signature check:
 - 1. Right-Click on “My Computer”, choose “Properties”
 - 2. Under the “Hardware” tab click on “Driver Signing”.
 - 3. Choose “Ignore”

Install Guidelines

The following install steps should be followed:

- Install prerequisites (*if NET Framework is not already installed*)
 - For WiMAX, install prerequisite .NET Framework 2.0 - <http://www.microsoft.com/downloads/details.aspx?familyid=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en>
 - Note: After installing a pre-requisite from the Microsoft web site, close the "Pre-requisites" dialogue without clicking on button "Next". Clicking on button "Next" will direct the user to the Microsoft web site again.
- To work with **Agilent* BSE** in OEM labs
 - Install the WiMAX software package first
 - Download the WiMAX OEM Tools Release from VIP –Intel® PROSet/Wireless **WiMAX OEM Tools v6.2.1 PV Release – TIC: TRWXW0551T (Kit #32754)**
 - For updated VaTU tool please refer to Intel® PROSet/Wireless **WiMAX OEM Tools v6.5 PC Release – TIC: TRWXW0625T (Kit #35943)**
 - After installing the OEM Tools kit - change directory to \Configurations\INNO\
 - Run "replace_wimax_db.bat" file which exists in the Configurations\INNO\Inno10MHz\ directory
 - You will be requested to "Restore settings for all Networks" for changes to take effect (***please refer to the screen captures on the following 2 slides for details***).
 - To revert back to default setup/frequencies - Please re-install the software.
 - It is no longer required to run the installer with any command line.
- To install API and SDK (*follow the installation steps*)
 - In the CMD run the following command for installing API/SDK with no UI: "msiexec /i "Intel WiMAX.msi" /qn ADDLOCAL=WIMAX_Software INSTALLSDK=TRUE"
 - In the CMD run the following command for installing API/SDK with UI: "msiexec /i "Intel WiMAX.msi" /qn INSTALLSDK=TRUE"

New features/updates

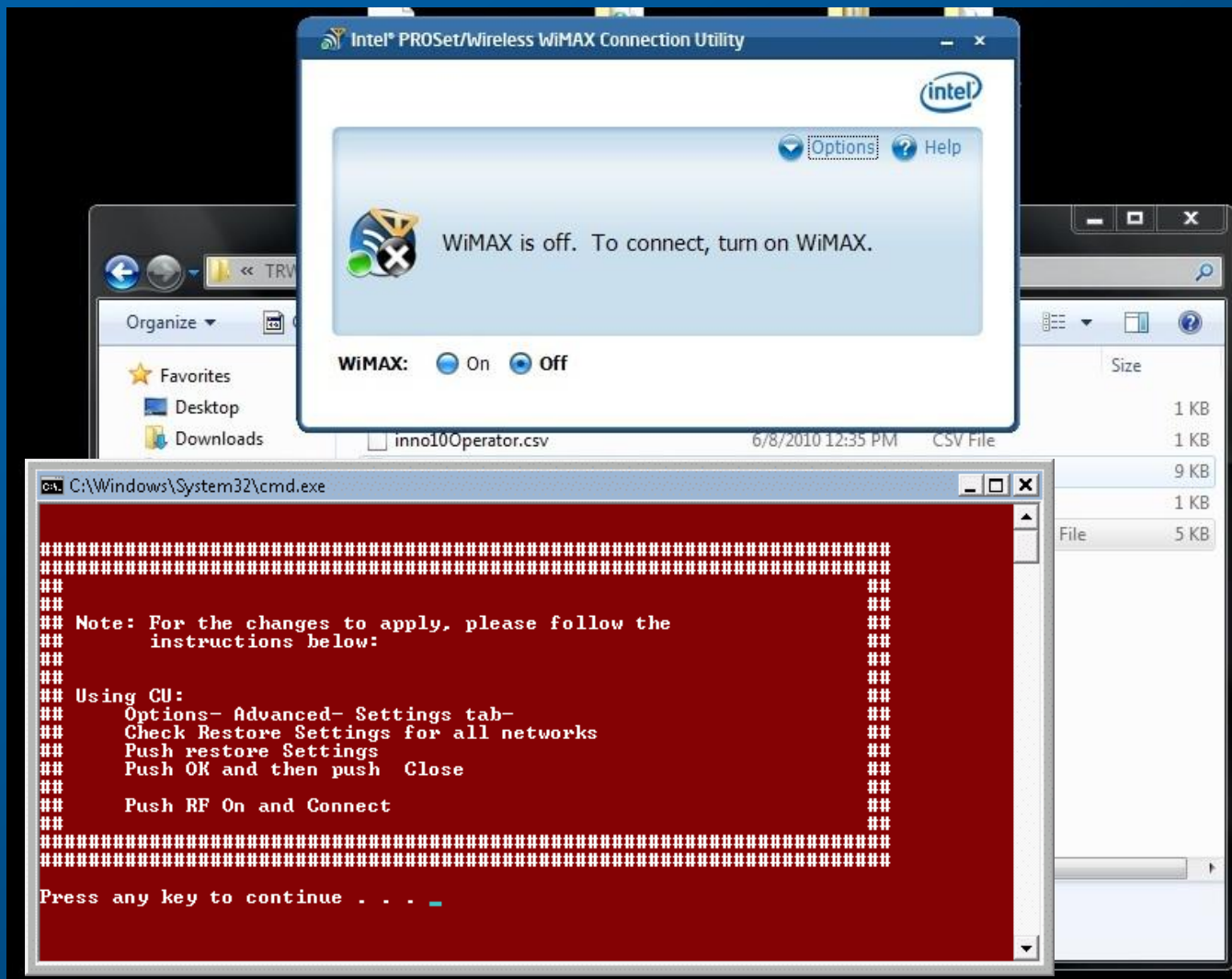
Install Guidelines (continued)

- **For RPT Lab Testing**– Install the WiMAX software package first
 - No change in RPT script usage from previous versions
 - TAS Disabling for KsP is embedded within RPT script
 - Download the WiMAX OEM Tools Release from VIP – Intel® PROSet/Wireless **WiMAX OEM Tools v6.2.1 PV Release** – TIC: TRWXW0551T (**Kit #32754**)
 - After installing the OEM Tools kit - change directory to \Configurations\RPT\
 - Enter the profile directory that is required for testing
 - Run “replace_wimax_db.bat” file which exists in the directory. For Win7/Vista right click on the script and select “Run as administrator”
 - Script will run in the command prompt window. For KsP – Please note that Disabling TAS operation completed successfully. TAS disable has no impact on KP device.
 - You will be requested to “Restore settings for all Networks” for changes to take effect (***please refer to the two screen captures towards the back of the slide deck***).
 - This should install all the required frequencies based on the supported WMF profiles.
 - To revert back to default setup/frequencies - Please uninstall & install the software

New features/updates

Install Guidelines (continued)

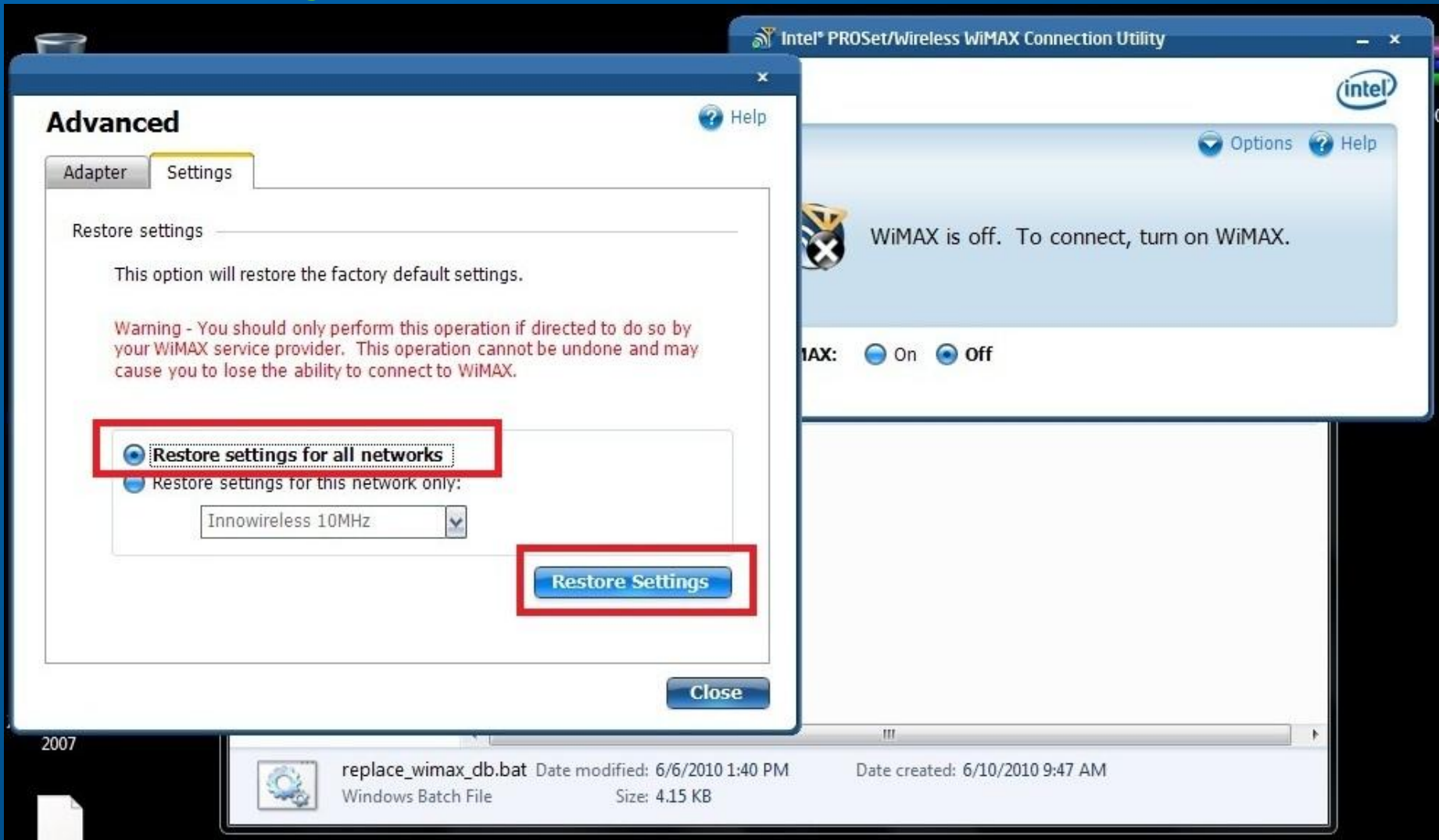
To work with Agilent* BSE



New features/updates

Install Guidelines (continued)

To work with Agilent* BSE



New features/updates

Backup

• ***WiMAX - Power Consumption***

• ***Clearwire***

• ***TRWXW0624***

• ***Huron River – Win7-64***

Power Consumption Test Environment (Intel Devices)

- Test environment – conductive, ~70dB path loss.
- Equipment: Digital oscilloscope (DPO4054), current probes (TCP312) w/power amplifiers (TCPA300).
- Digital oscilloscope is used to measure all power consumption states.
- Only 3.3V (Aux and Main) was measured.
- Measurements do not include WLAN and/or WWAN LED power consumption for the Intel Device
- The average power consumption is measured over a 100 second period.
- All measurements are with Wi-Fi driver installed and not disabled.

Power Consumption States

<i>State</i>	<i>Description</i>
Disabled	Average power consumption when driver is disabled.
Hibernate	Average power consumption when the system is in S4 – hibernate.
Shutdown	Average power consumption when the system is in S5c – shutdown.
Standby	Average power consumption when the system is in S3 – standby.
Not Connected Power Down	Average power consumption when the DUT is not connected to any network, is not scanning for networks, and power savings is enabled (for example, USB is in selective suspend). Power supply = battery.

Power Consumption States

<i>State</i>	<i>Description</i>
Not Connected	Average power consumption when the DUT is not connected to any network, is periodically scanning for networks, and power savings is enabled. Power supply = battery.
Connected	Average power consumption while the DUT is connected, scanning periodically, and power savings is enabled. There is no network traffic and the system is not busy.
Connected – Idle mode 5secs	Average power consumption while the DUT is in WiMax Idle mode. Paging interval is set to 5 seconds. Paging listen interval is 2 frames.
Mobile Mark 2005 Wireless Web Browsing	Average power consumption while DUT is connected, scanning periodically, and power savings is enabled, and downloading 150 KB web pages every 15 seconds.
Voice Call	This is the average power consumption when performing a VoIP call (8kbps + overhead, 20ms interval, with silence suppression).

Power Consumption States

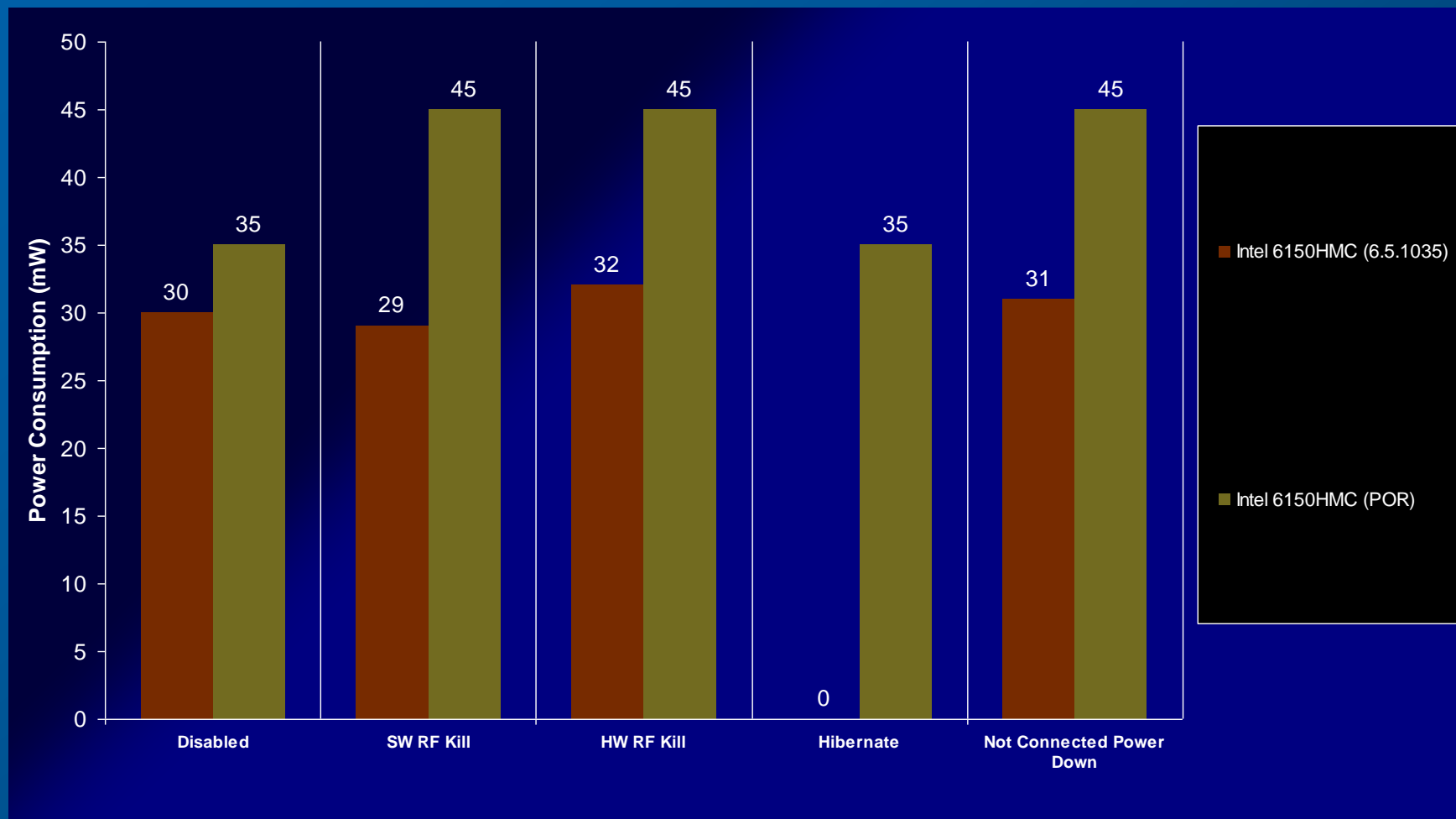
<i>State</i>	<i>Description</i>
Tx Average (UL @ 1 Mbps)	Average power consumption while device is transmitting at 1 Mbps.
Tx Average (UL @ max Mbps)	Average power consumption while device is transmitting at maximum throughput.
Rx Average (DL @ 2 Mbps)	Average power consumption while device is receiving at 2 Mbps.
Rx Average (DL @ max Mbps)	Average power consumption while device is receiving at maximum throughput.
Tx/Rx Average (UL and DL @ max Mbps)	Average power consumption while device is transmitting and receiving at maximum throughput.
Tx/Rx Average – Cell Edge (UL and DL @ max Mbps)	Average power consumption while device is transmitting and receiving at maximum throughput while at the cell edge (maximum Tx power).

Summary

- All low power states are below POR
- All Idle/Low traffic states are below POR
- All throughput power consumption measurements are below POR

•Power Consumption - Low Power States

•Huron River-MS Win7-64 (10MHz),2.5GHz



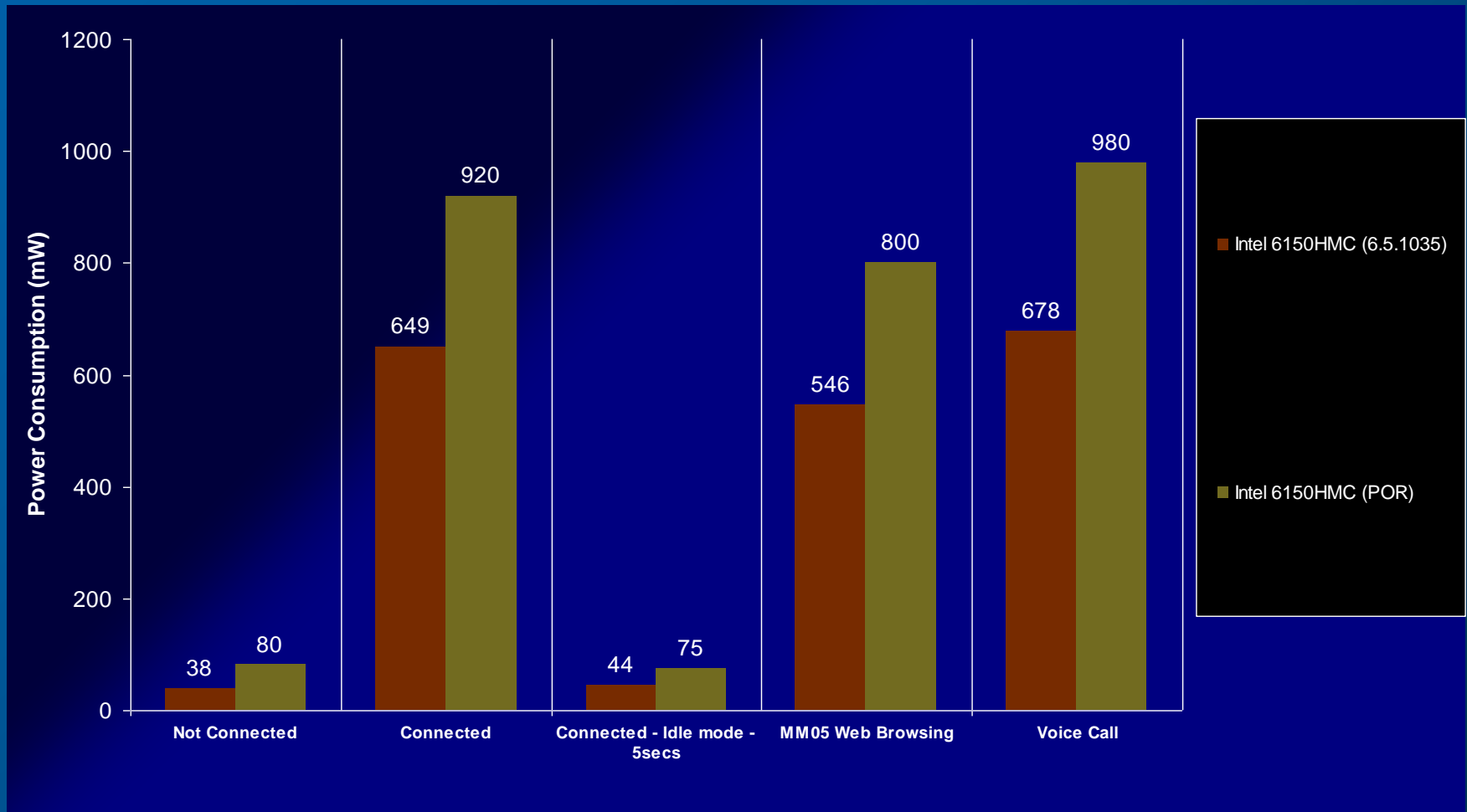
Configurations and Disclaimers

•DUT setup:Platform-Huron River; OS-MS Win7-64; Nic Version-QS Vol; Network-ClearWire.Alpha.

•Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel core products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance.

•Power Consumption - Idle and Common Usage Power States

•Huron River-MS Win7-64 (10MHz),2.5GHz



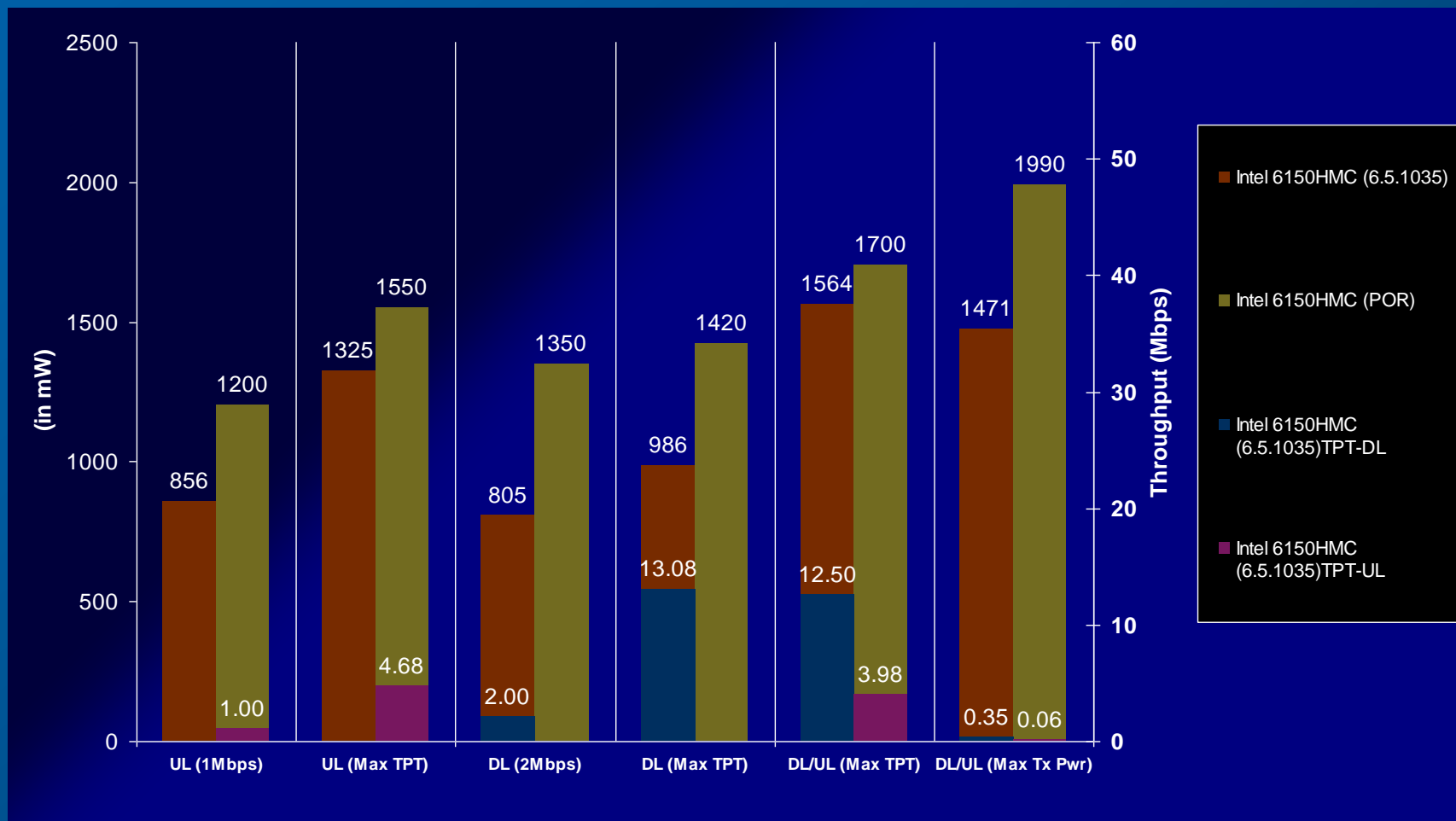
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•Power Consumption - Tx/Rx Power States

•Huron River-MS Win7-64 (10MHz),2.5GHz



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• ***WiMAX - Power Consumption***

• ***Clearwire***

• ***TRWXW0624***

• ***Pine Trail – XP32sp3***

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Power Consumption States

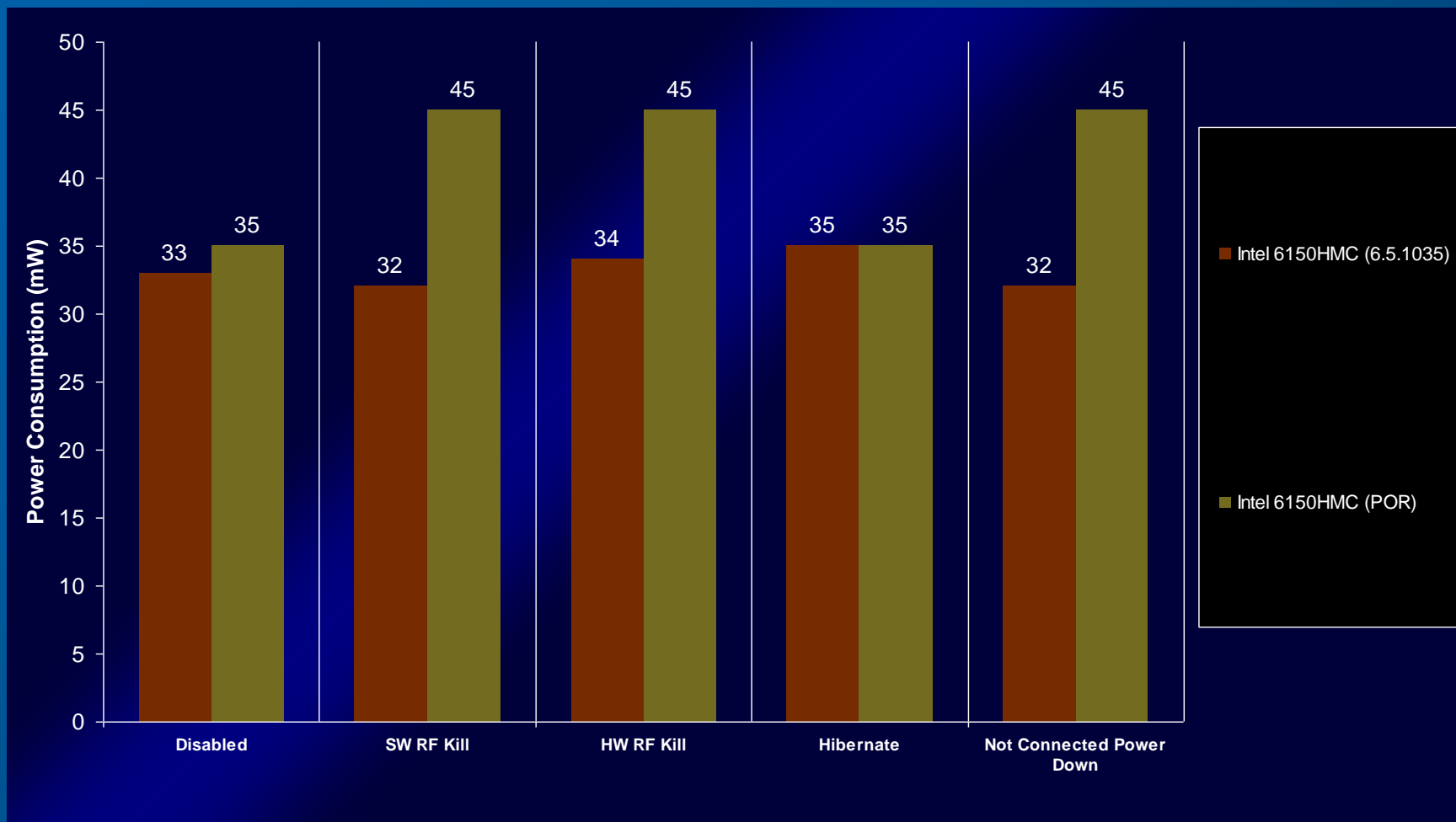
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Tx/Rx Average – Cell Edge (UL and DL @ max Mbps)	Average power consumption while device is transmitting and receiving at maximum throughput while at the cell edge (maximum Tx power).

Summary

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- All Idle/Low traffic states are below POR
- All throughput power consumption measurements are below POR

•Power Consumption - Low Power States

•Pine Trail-MS XP32sp3 (10MHz),2.5GHz



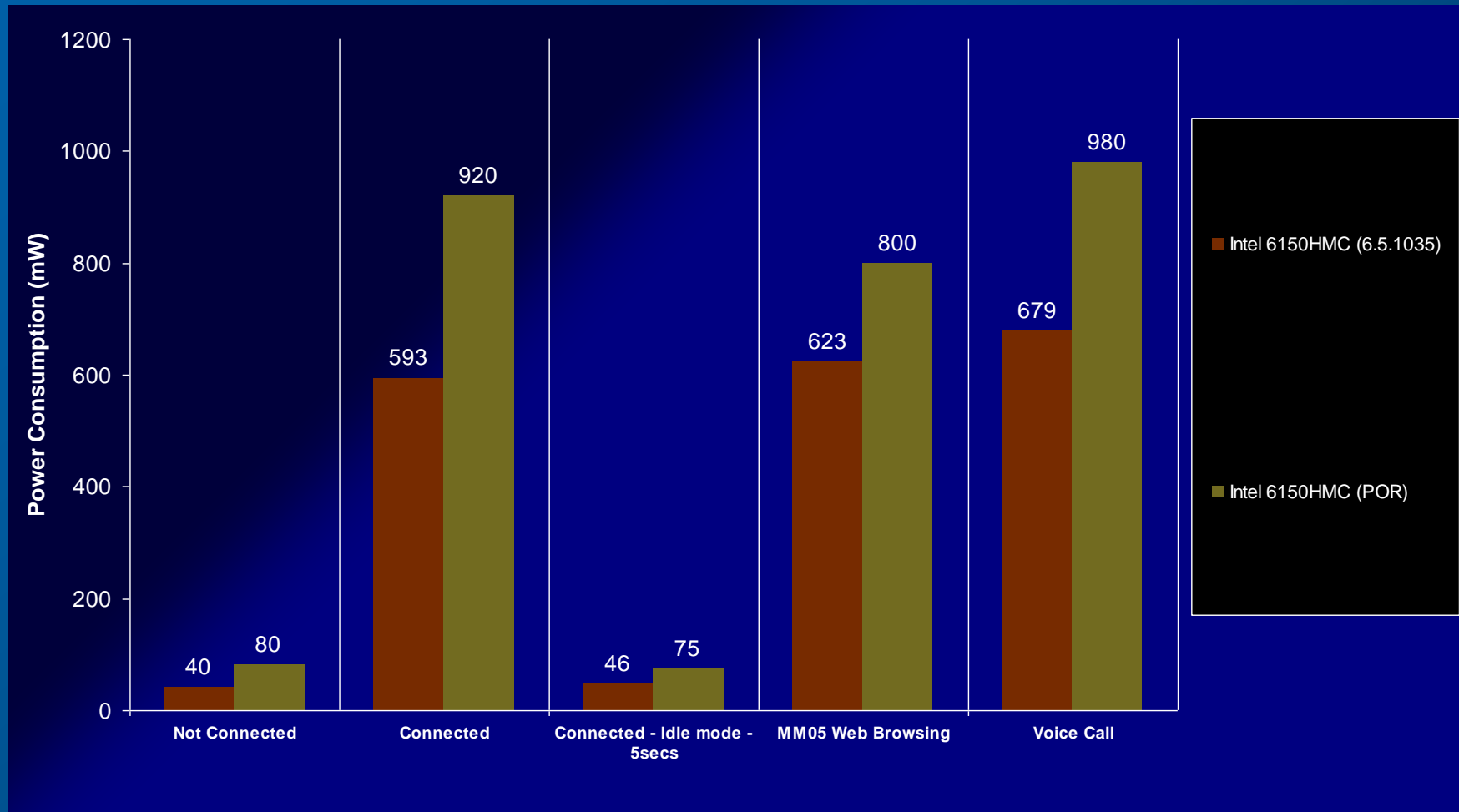
Configurations and Disclaimers

•DUT setup:Platform-Pine Trail; OS-MS XP32sp3; Nic Version-SRA; Network-ClearWire.Alpha.

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•Power Consumption - Idle and Common Usage Power States

•Pine Trail-MS XP32sp3 (10MHz),2.5GHz



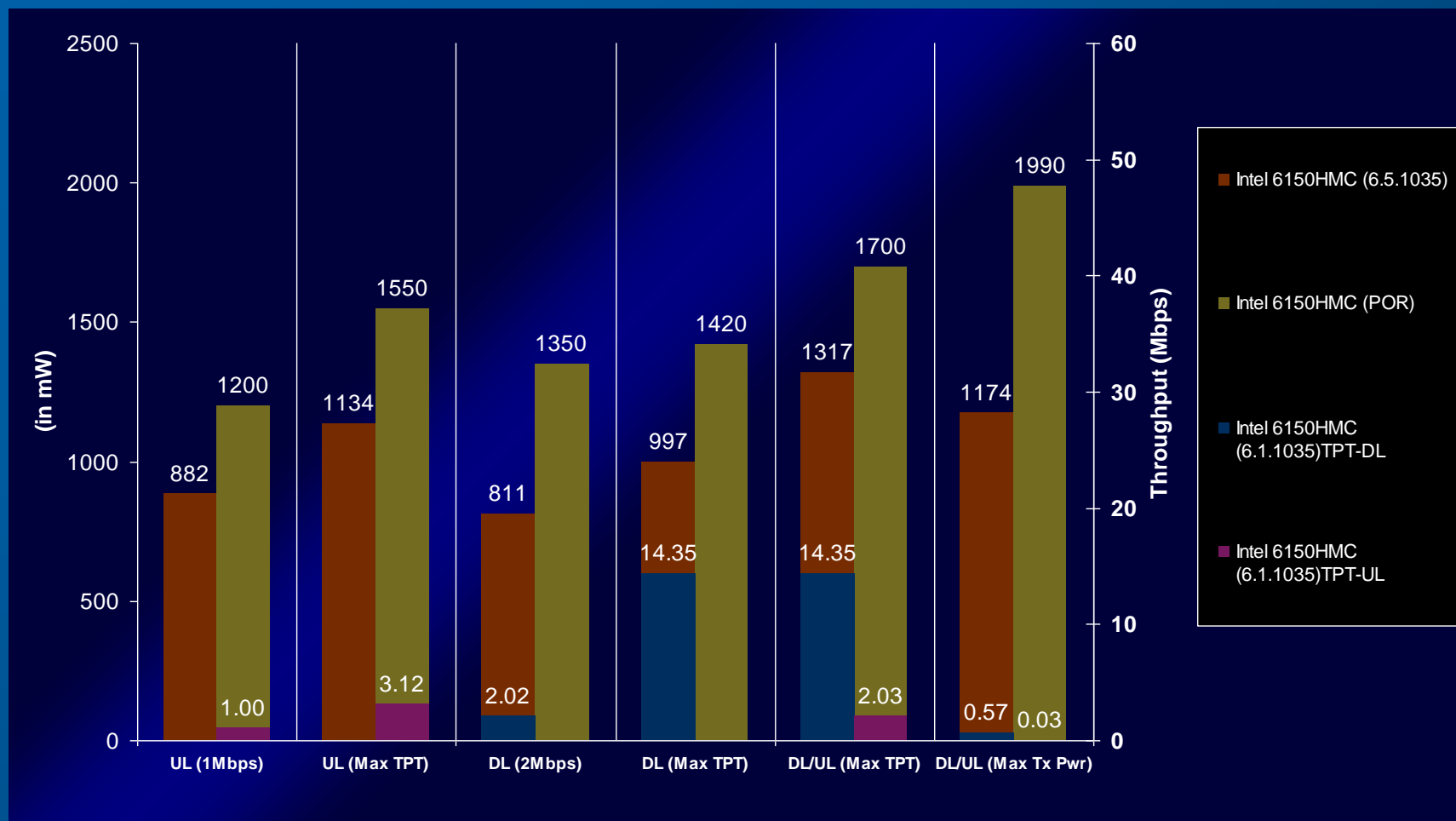
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•Power Consumption - Tx/Rx Power States

•Pine Trail-MS XP32sp3 (10MHz),2.5GHz



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Conductive Performance Kilmer Peak

V
E

Setup

Conductive Throughput

MOT BS: VE OREGON Lab CLEAR ALPHA Network (WMX 3.1 DAP 3.0.10.33.07)

Kilmer Peak build: KP -V HMC, TRWXW0624G(6.5.1035.26), HOWFW0515G(14.1.1.3)

Traffic Tool: iperf

tcp

iperf -s -i2 -l1300 -w64k

iperf -c <ip_address> -w64k -P5 -i2 -l1300 -t60

udp

ul: iperf -c <ip_address> -b6M -l1300 -w128k

dl: iperf -c <ip_address> -b20M -l1300 -w128k

OS: Microsoft Windows 7 (32 bit)

Platform: CALPELLA

Connection setup: High Correlation & Low Correlation connection setup

Channels: AWGN, VehA 60 km/h, PedB 3 km/h

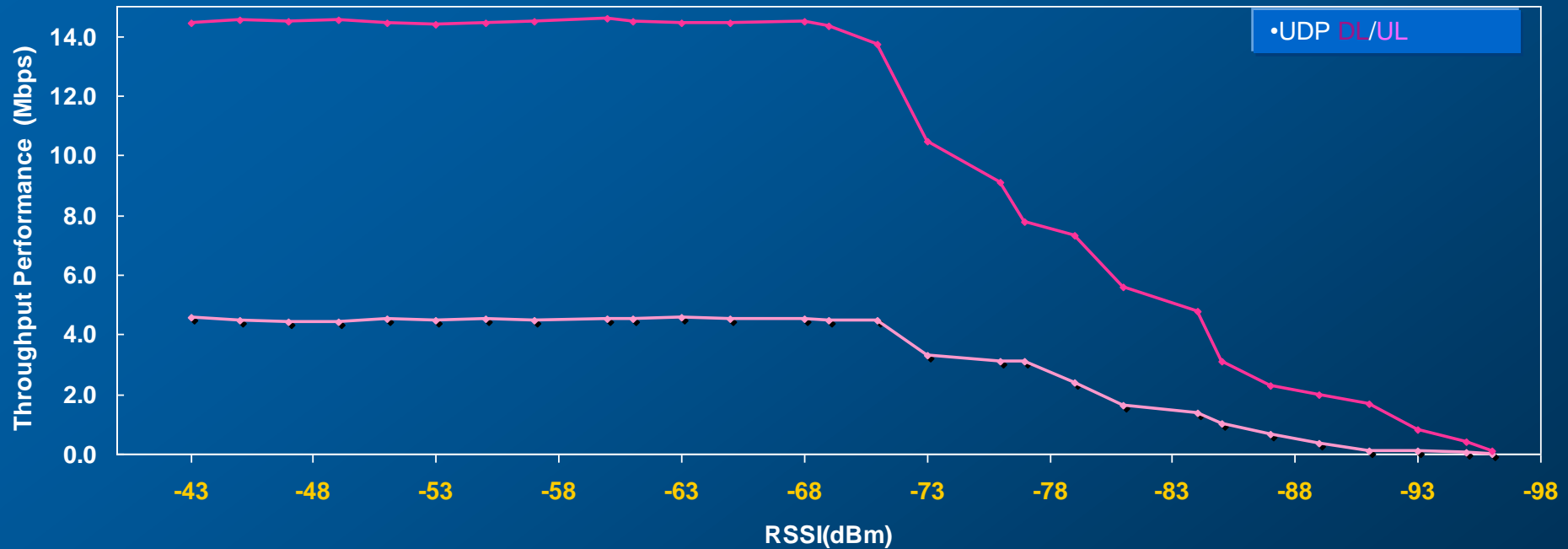
MAX Throughput UDP

Channel Model	UL Max TPT (Mbps)	DL Max TPT (Mbps)
AWGN High Correlation	4.56	14.61
AWGN Low Correlation	4.60	18.96
VehA 60km/h High Correlation	3.49	13.11
VehA 60km/h Low Correlation	3.75	13.13
PedB 3km/h High Correlation	4.21	15.93
PedB 3km/h Low Correlation	4.29	16.40

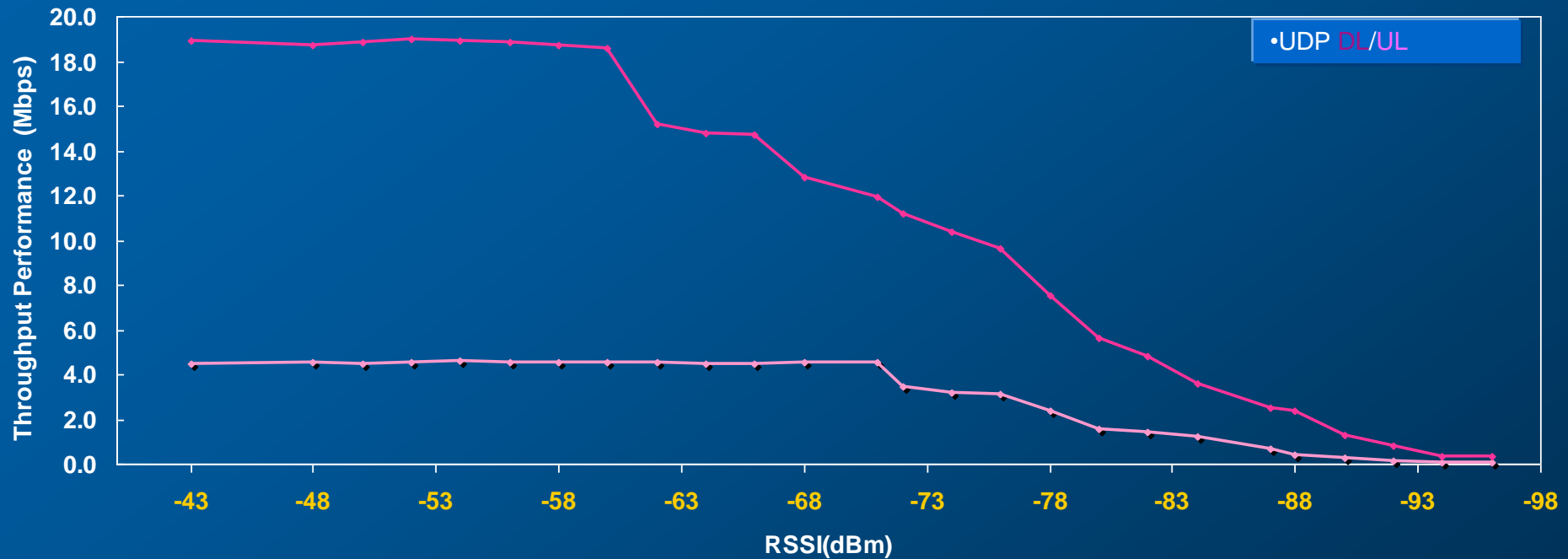
MAX Throughput TCP

Channel Model	UL Max TPT (Mbps)	DL Max TPT (Mbps)
AWGN High Correlation	4.50	14.40
AWGN Low Correlation	4.50	18.78
VehA 60km/h High Correlation	3.57	13.42
VehA 60km/h Low Correlation	3.47	13.66
PedB 3km/h High Correlation	3.95	16.07
PedB 3km/h Low Correlation	4.07	16.12

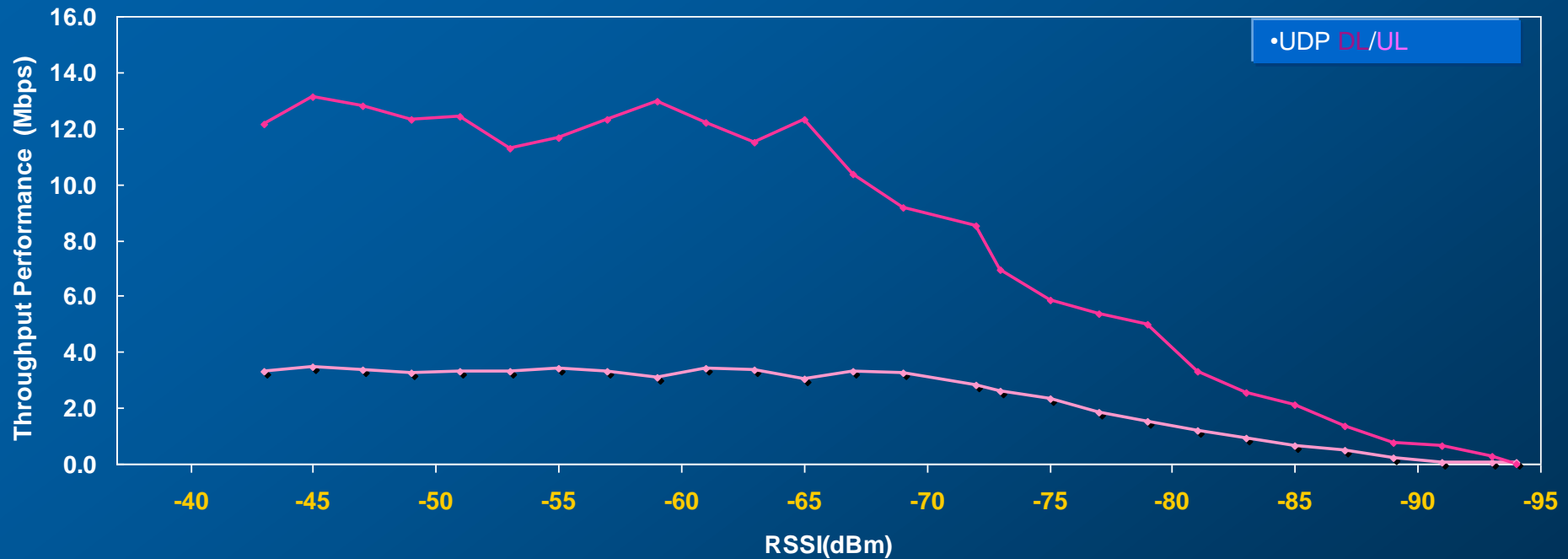
•Kilmer Peak Conductive Performance AWGN High Correlation



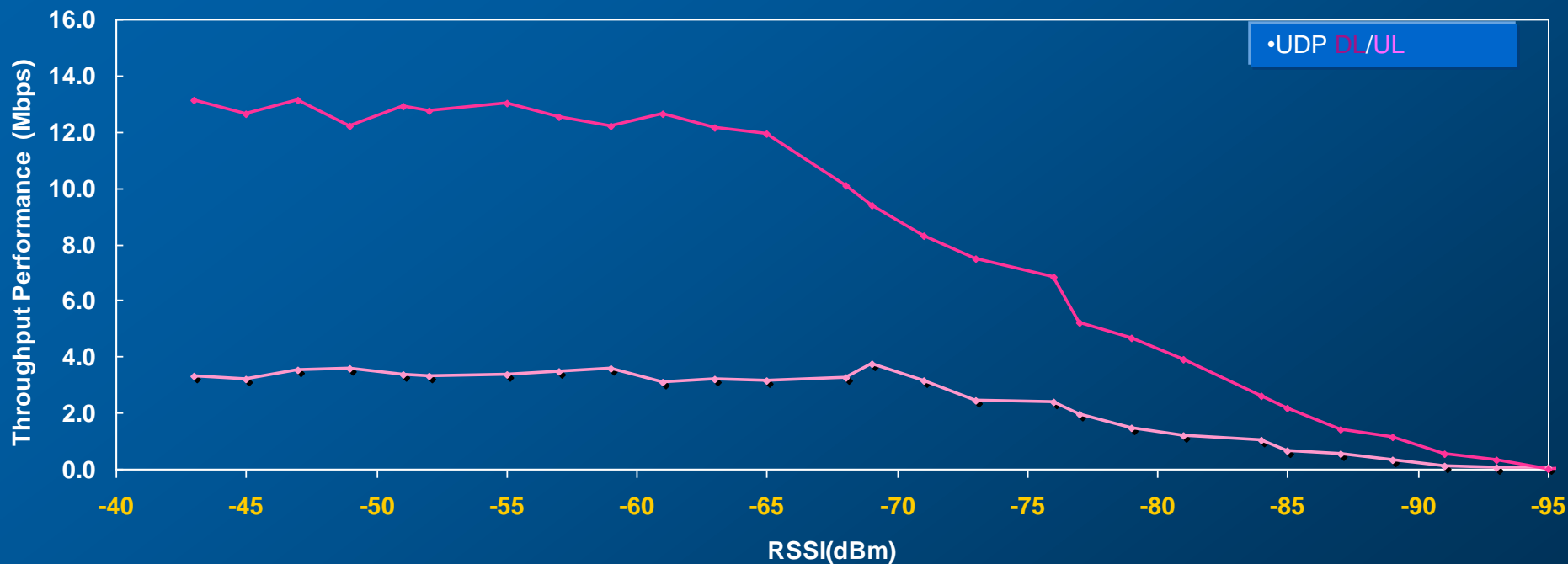
•Kilmer Peak Conductive Performance AWGN Low Correlation



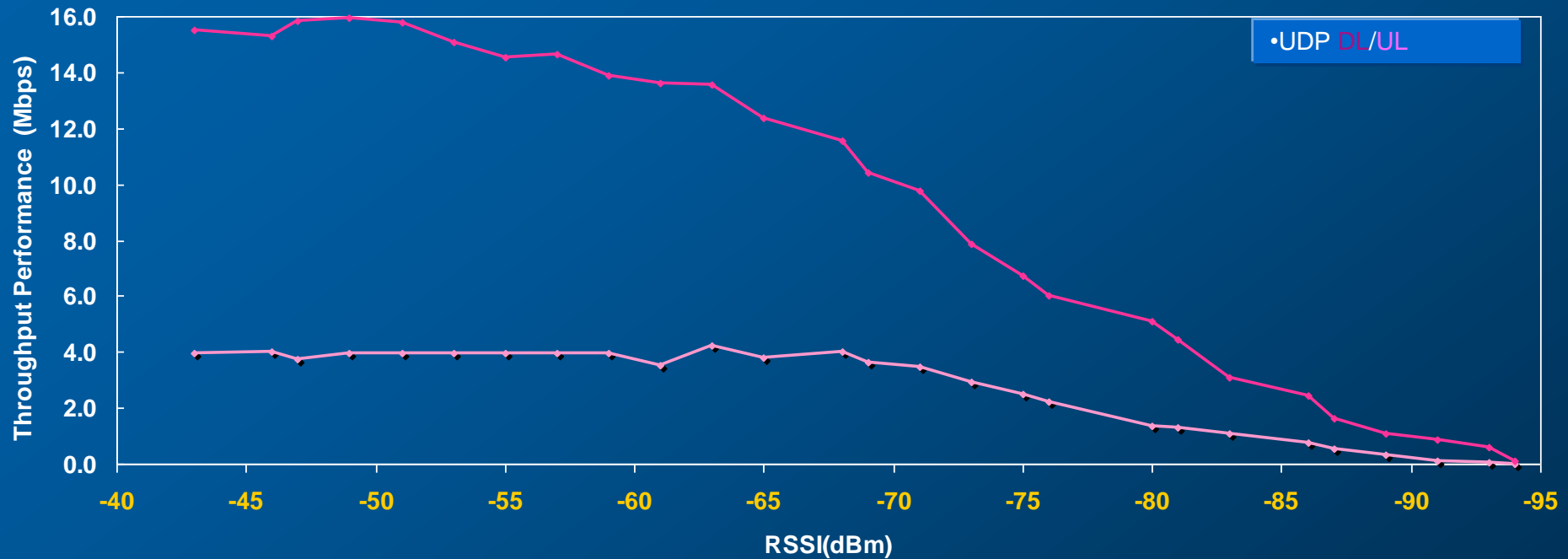
•Kilmer Peak Conductive Performance VehA 60km/h High Correlation



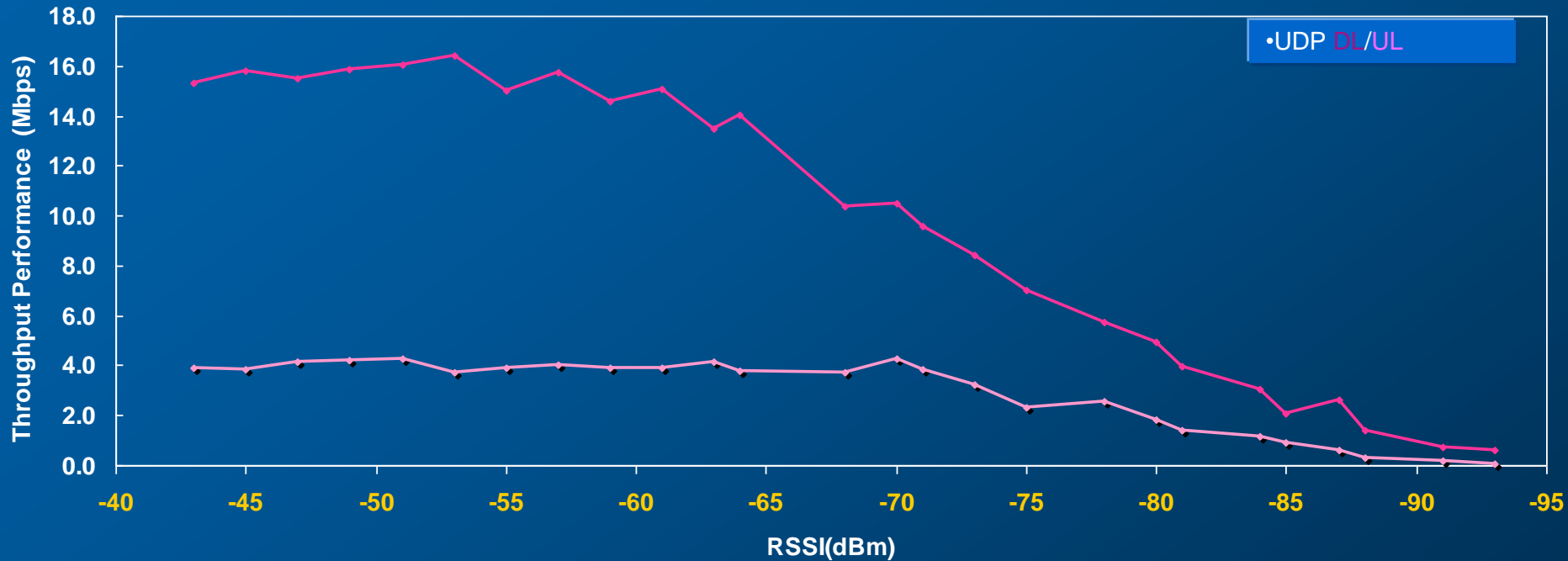
•Kilmer Peak Conductive Performance VehA 60km/h Low Correlation



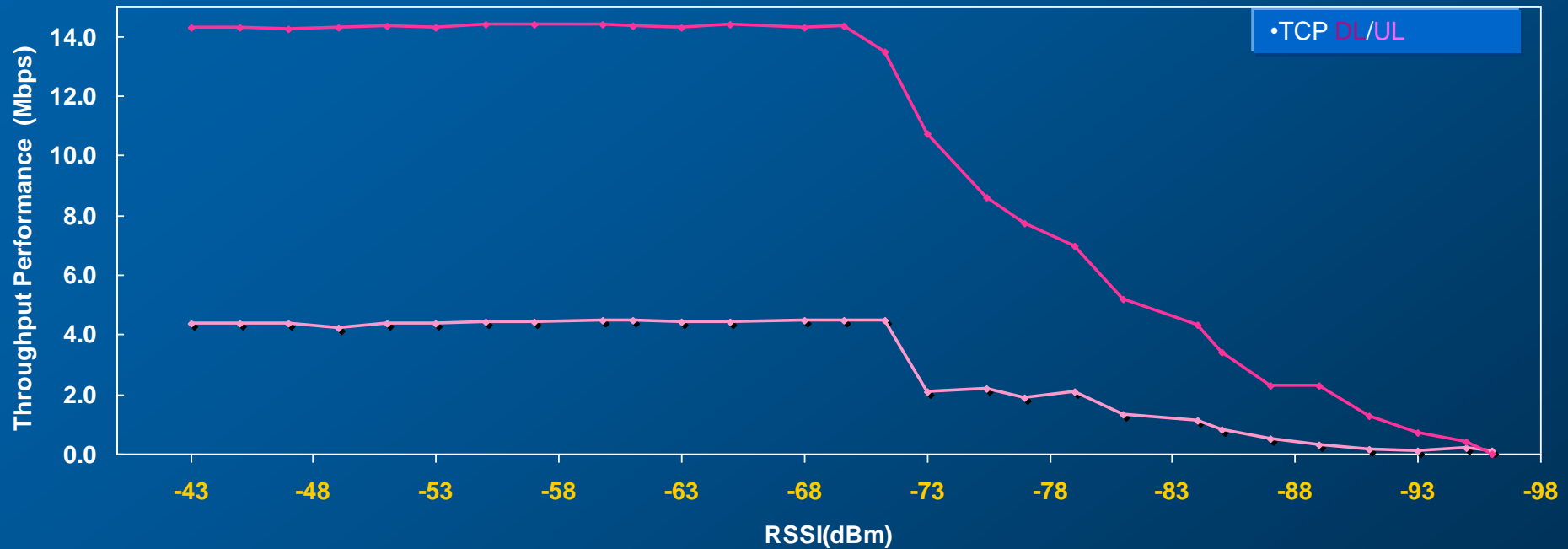
•Kilmer Peak Conductive Performance PedB 3km/h High Correlation



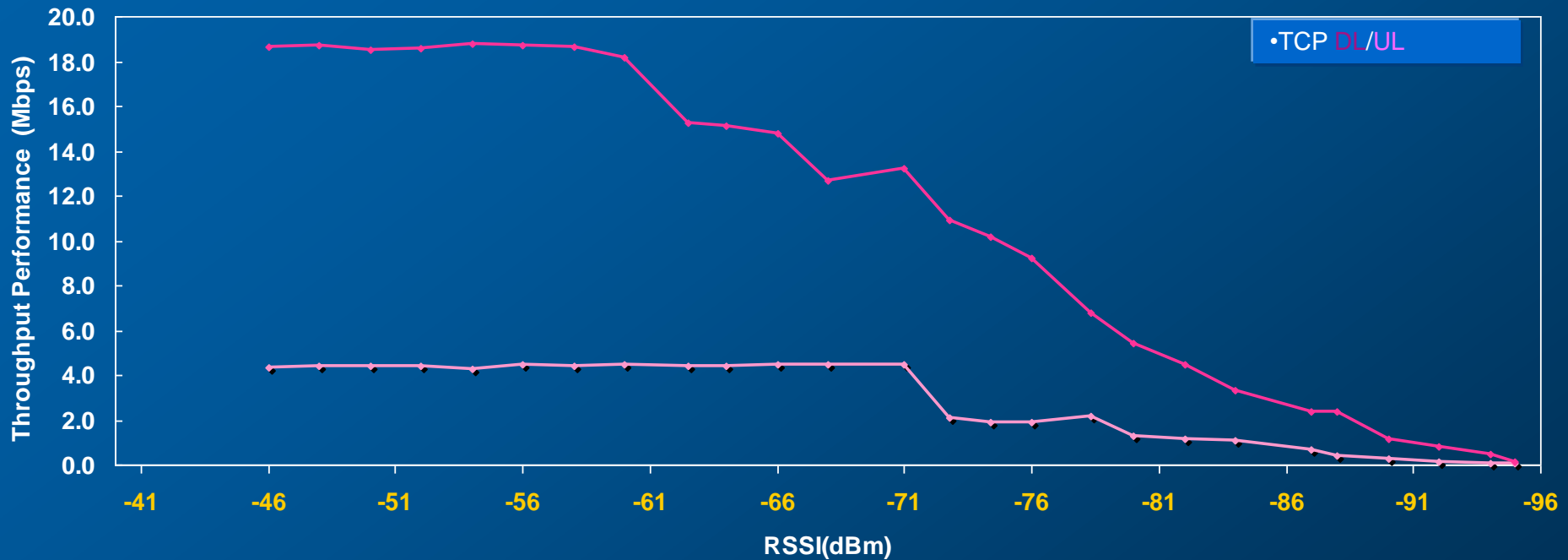
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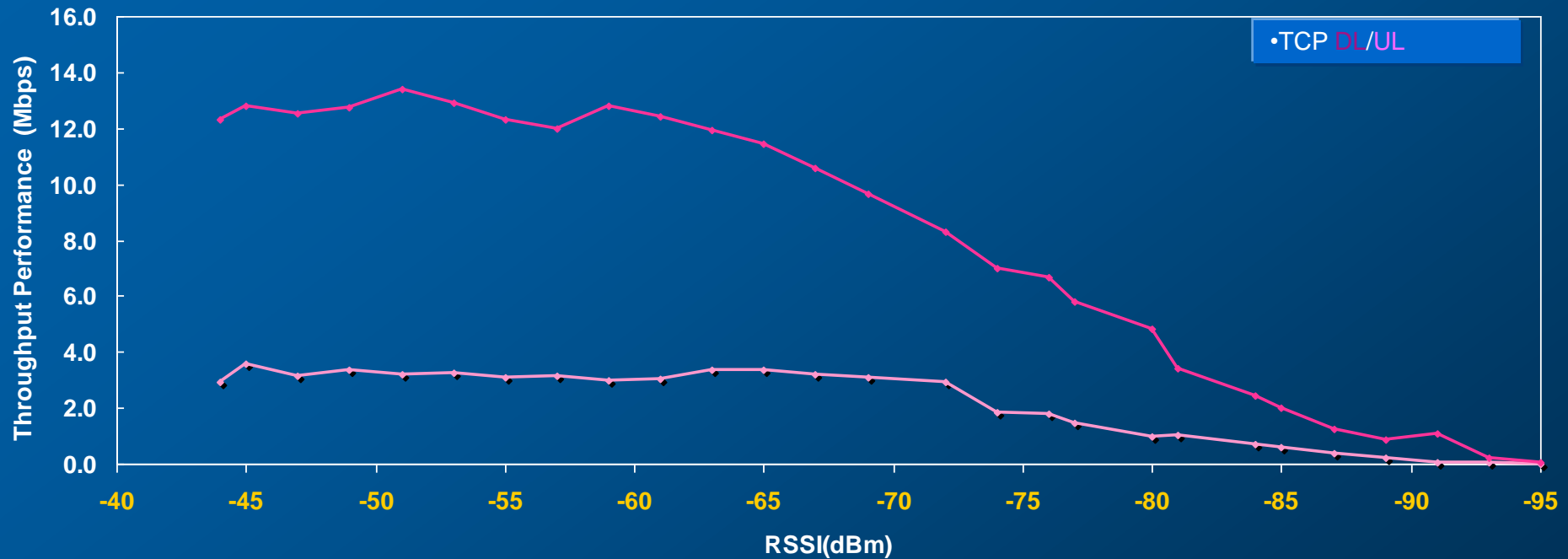
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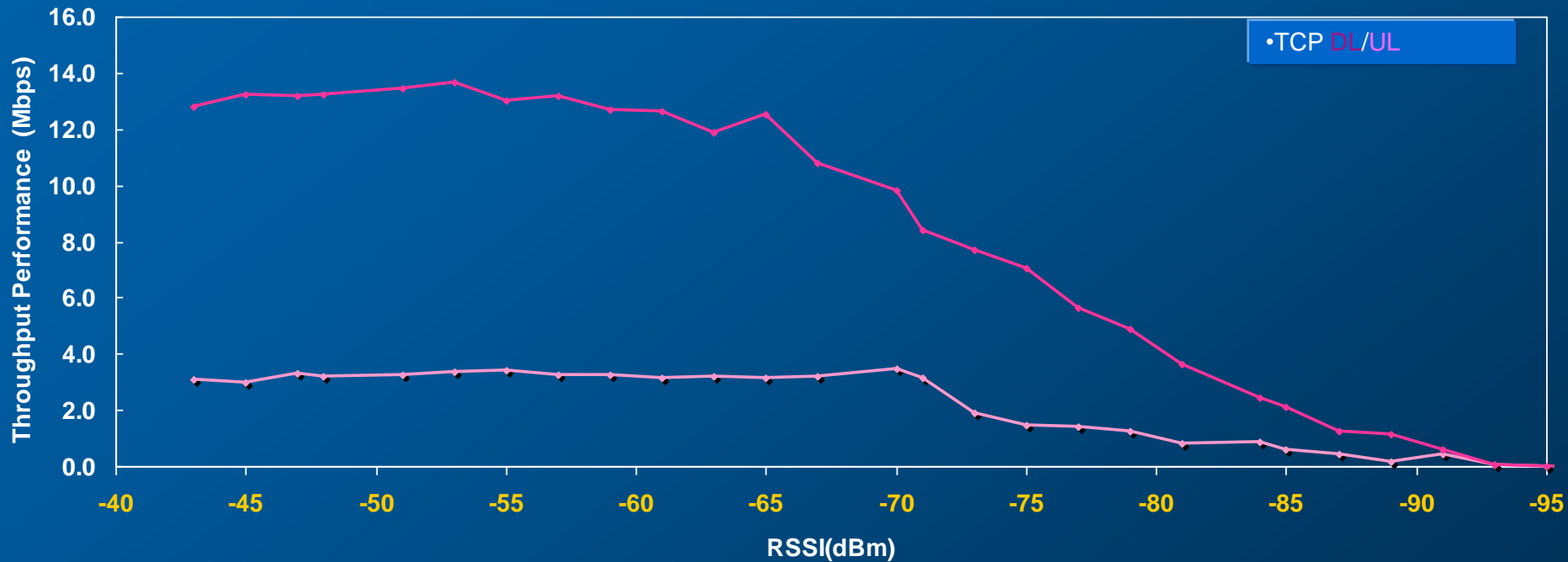
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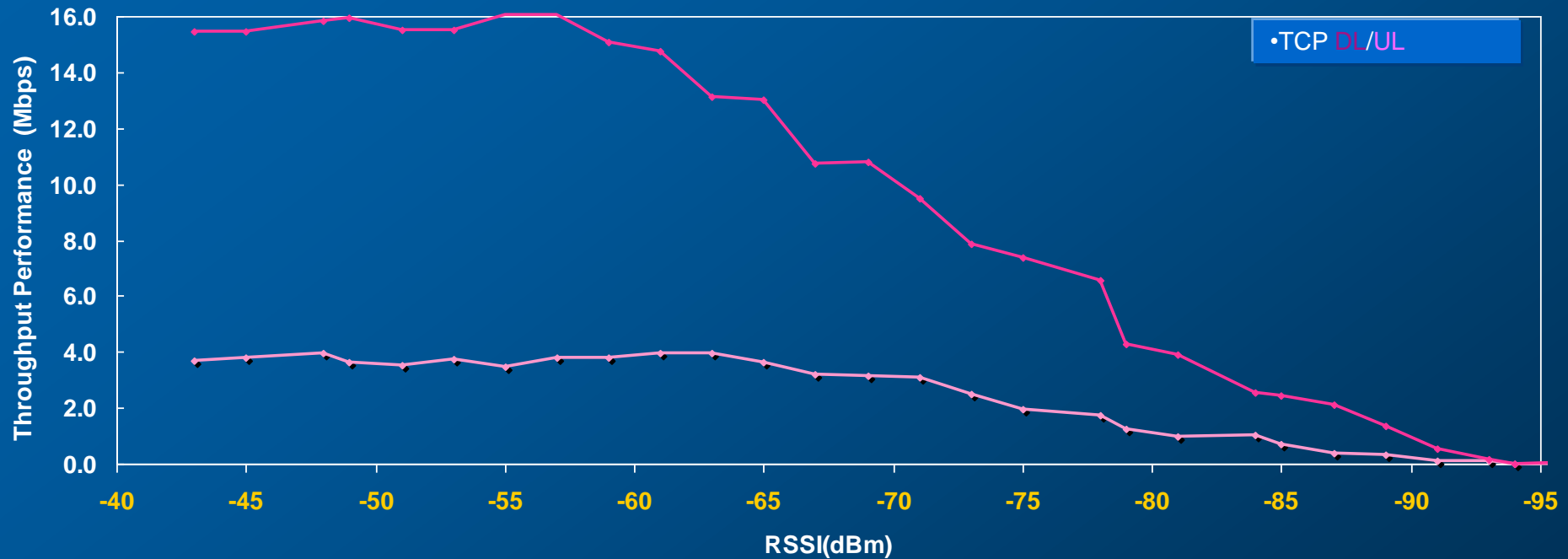
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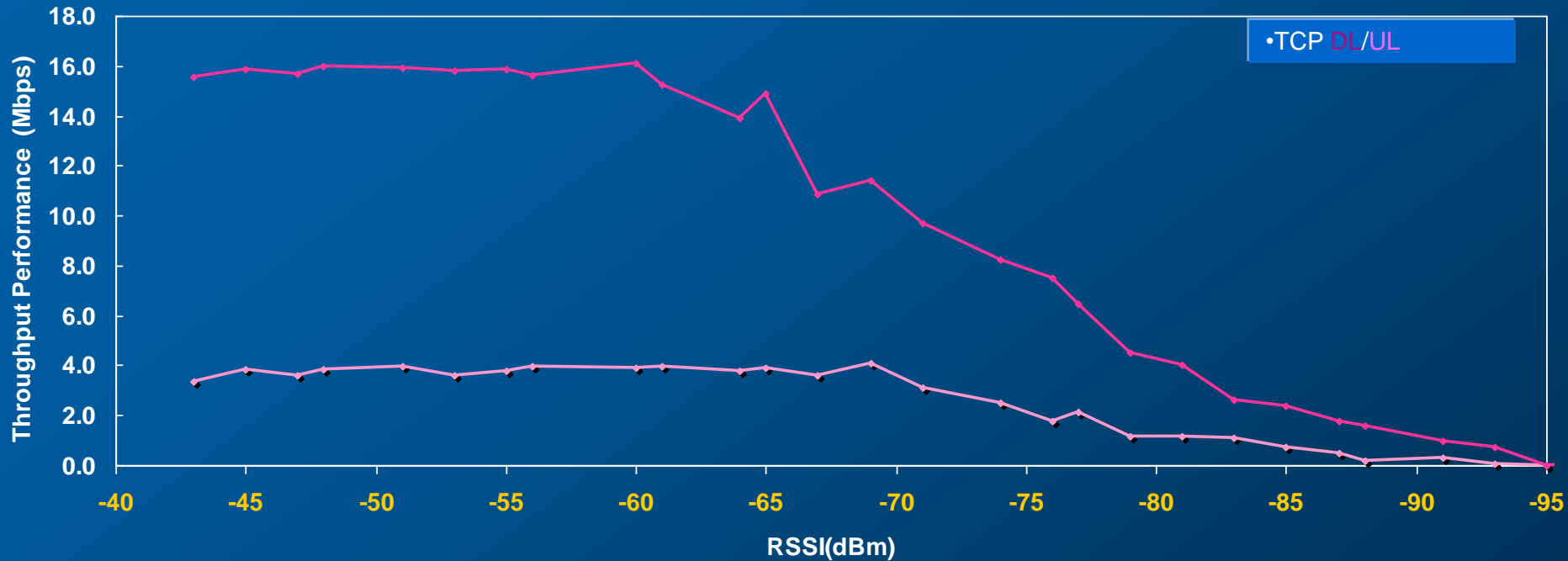
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Conductive Performance Kelsey Peak

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udp

ul: iperf -c <ip_address> -b6M -l1300 -w128k

dl: iperf -c <ip_address> -b20M -l1300 -w128k

OS: Microsoft Windows 7 (64 bit)

Platform: Huron River

Connection setup: High Correlation & Low Correlation connection setup

Channels: AWGN, VehA 60 km/h, PedB 3 km/h

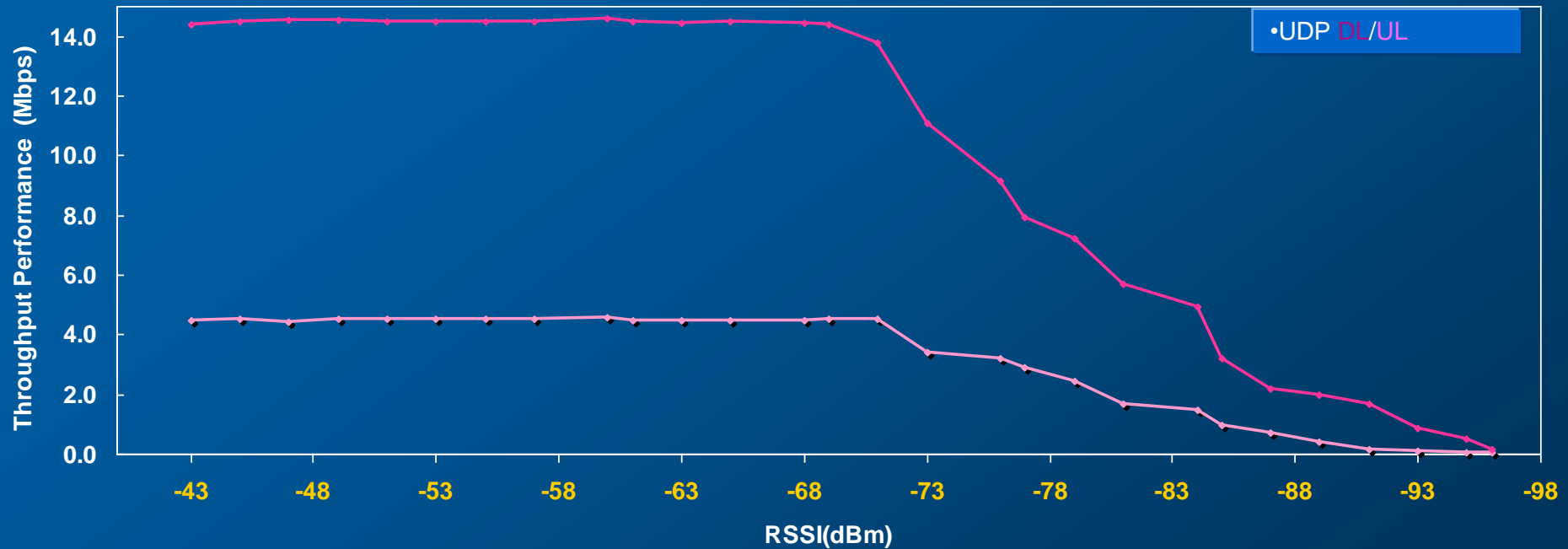
MAX Throughput UDP

Channel Model	UL Max TPT (Mbps)	DL Max TPT (Mbps)
AWGN High Correlation	4.56	14.58
AWGN Low Correlation	4.60	18.90
VehA 60km/h High Correlation	3.51	13.55
VehA 60km/h Low Correlation	3.79	13.86
PedB 3km/h High Correlation	4.00	15.58
PedB 3km/h Low Correlation	4.35	15.87

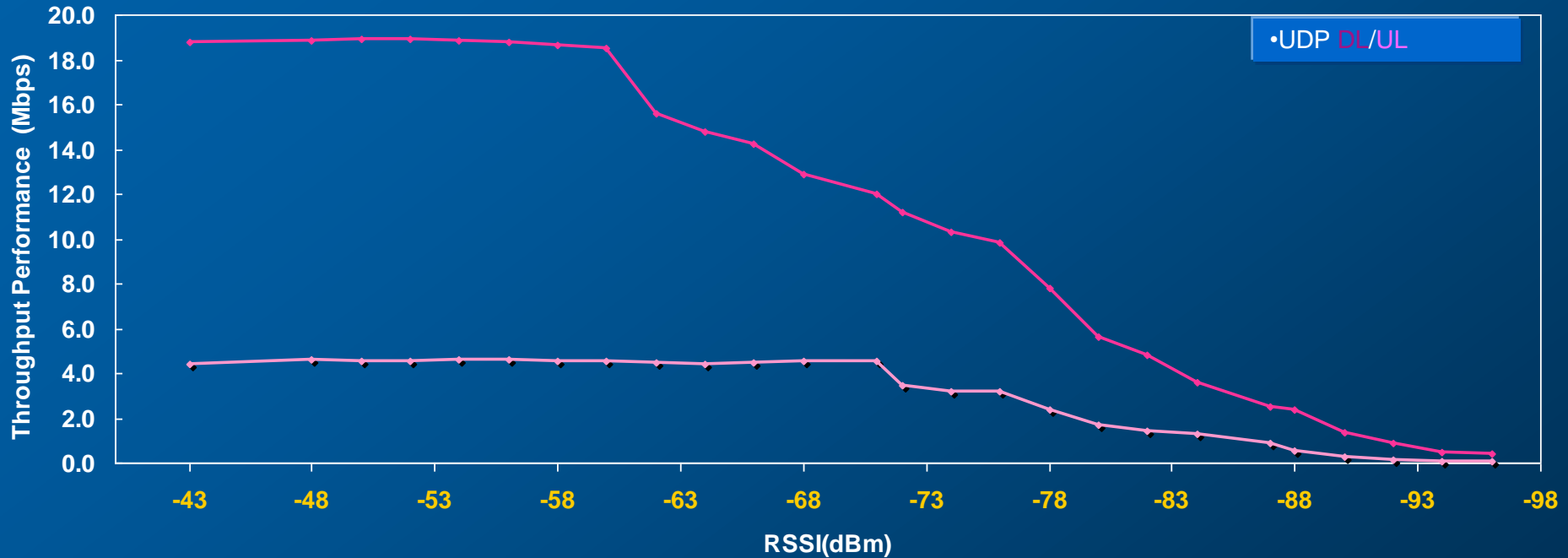
MAX Throughput TCP

Channel Model	UL Max TPT (Mbps)	DL Max TPT (Mbps)
AWGN High Correlation	4.51	14.47
AWGN Low Correlation	4.51	18.79
VehA 60km/h High Correlation	3.45	13.41
VehA 60km/h Low Correlation	3.61	13.54
PedB 3km/h High Correlation	3.91	15.58
PedB 3km/h Low Correlation	4.23	15.75

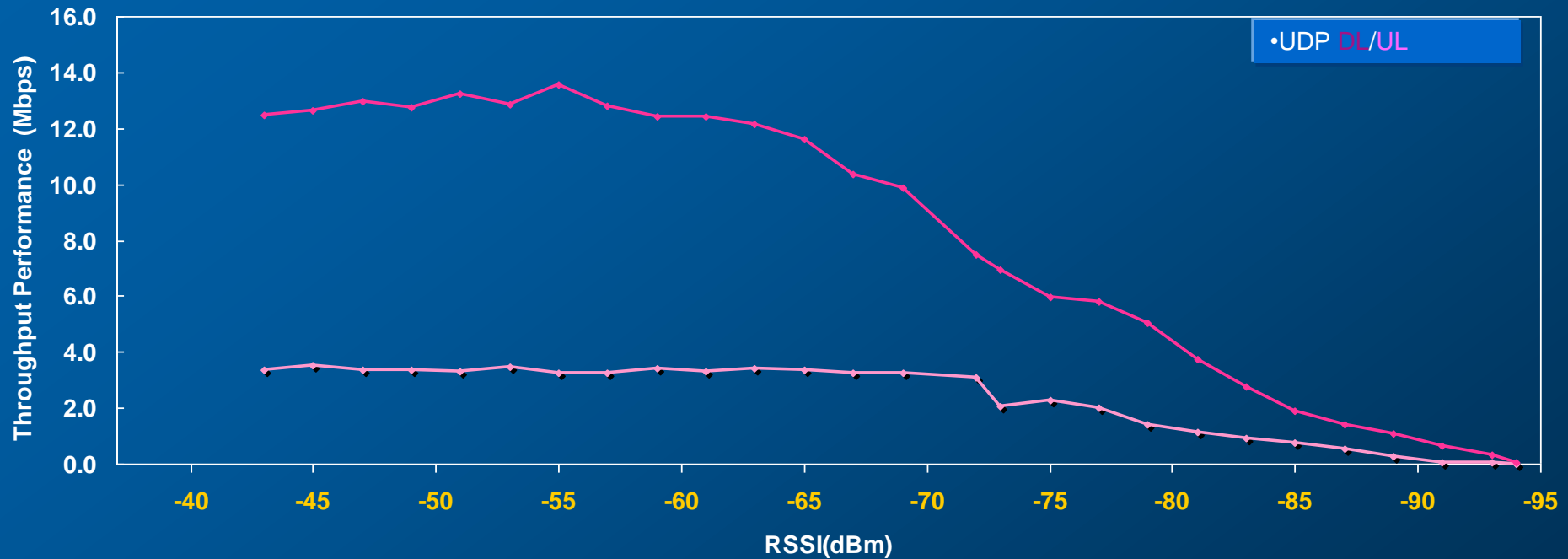
•Kilmer Peak Conductive Performance AWGN High Correlation



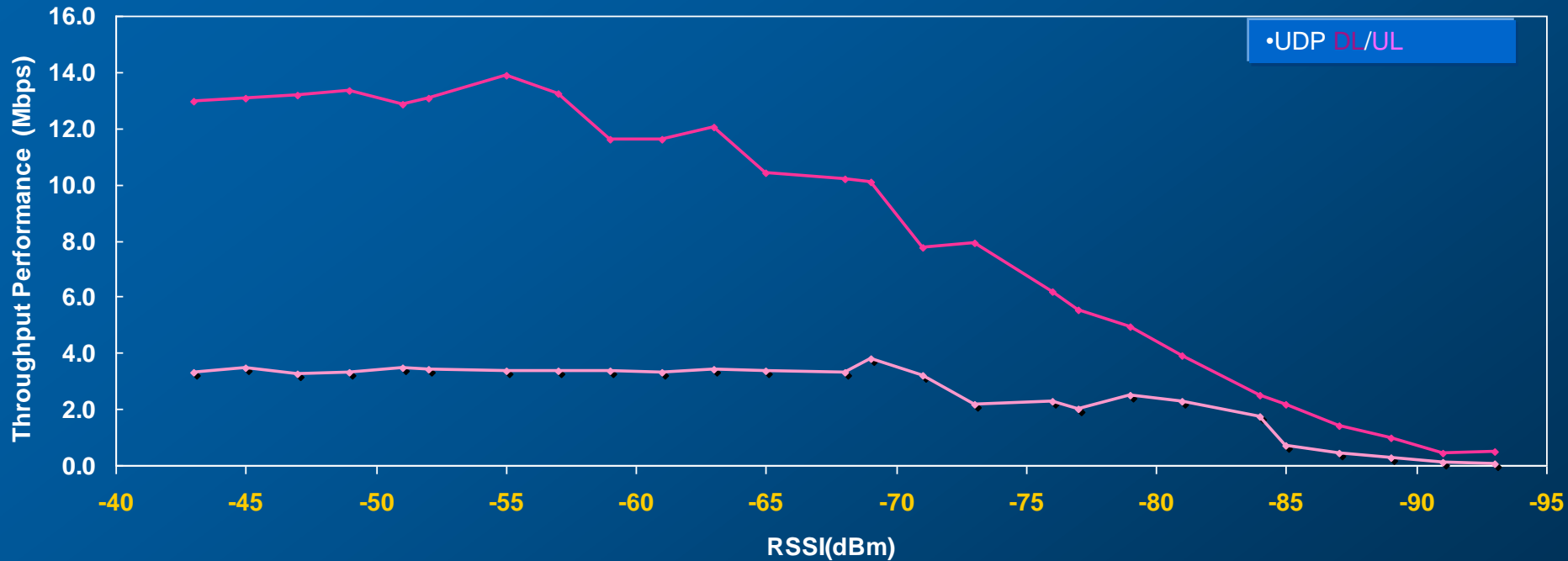
•Kilmer Peak Conductive Performance AWGN Low Correlation



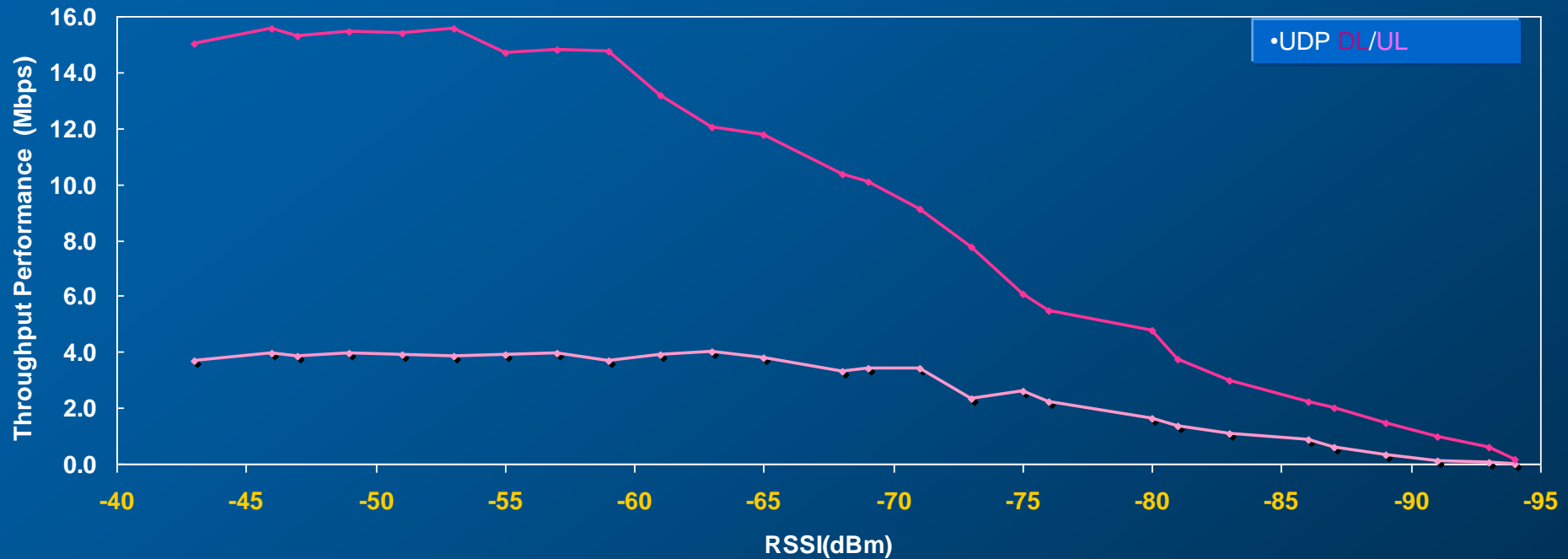
•Kilmer Peak Conductive Performance VehA 60km/h High Correlation



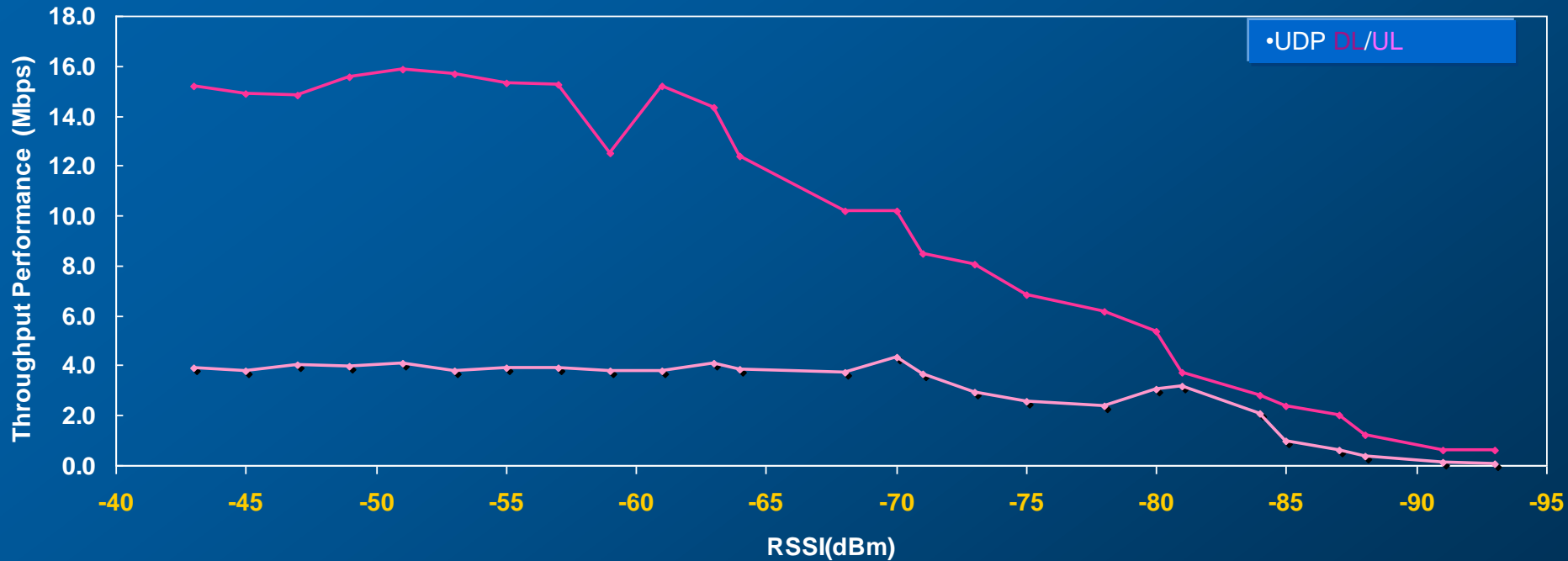
•Kilmer Peak Conductive Performance VehA 60km/h Low Correlation



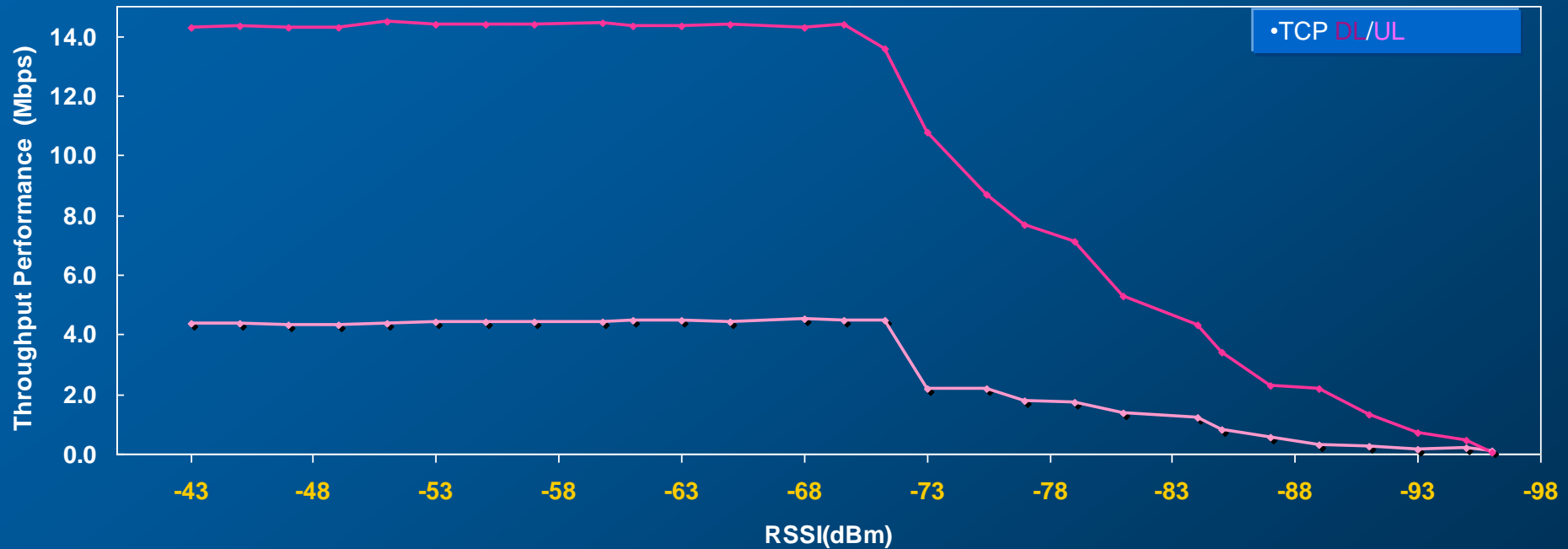
•Kilmer Peak Conductive Performance PedB 3km/h High Correlation



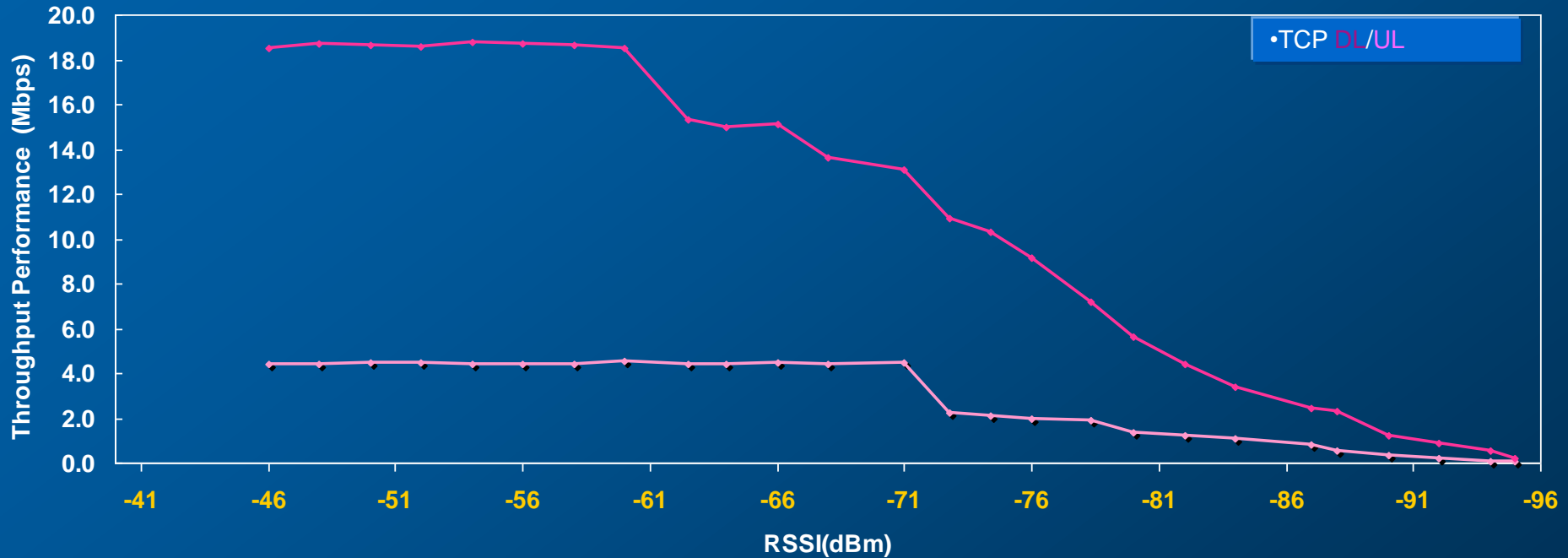
•Kilmer Peak Conductive Performance PedB 3km/h Low Correlation



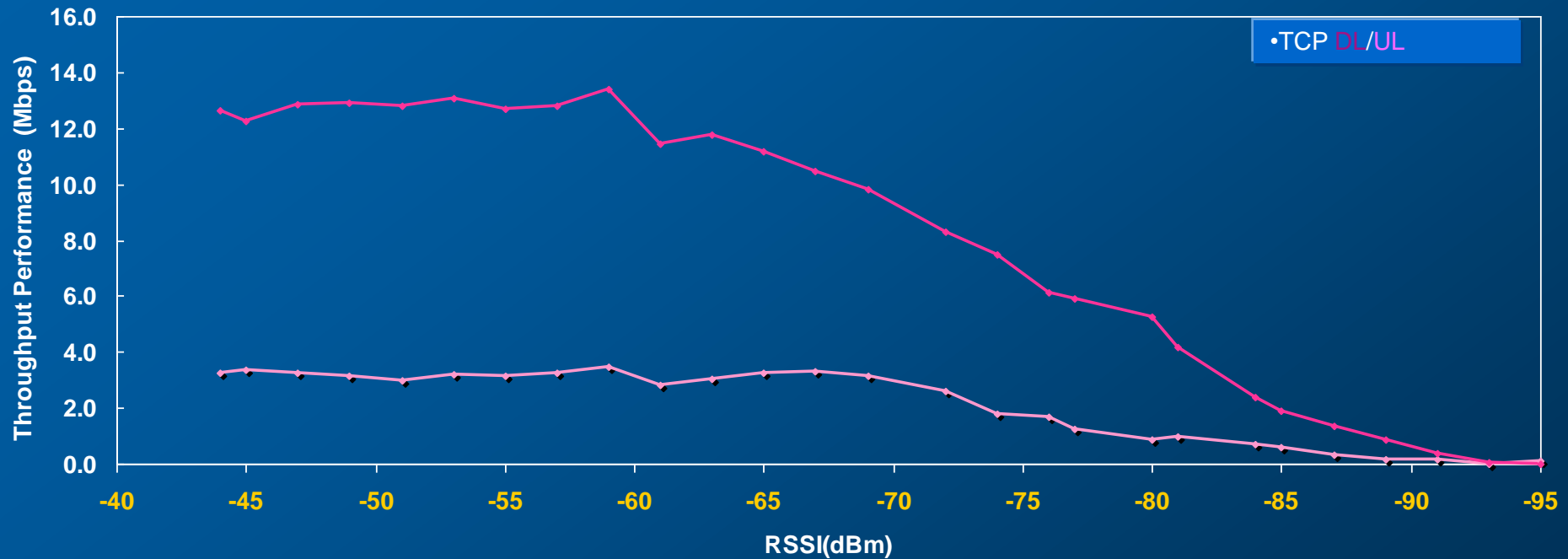
•Kilmer Peak Conductive Performance AWGN High Correlation



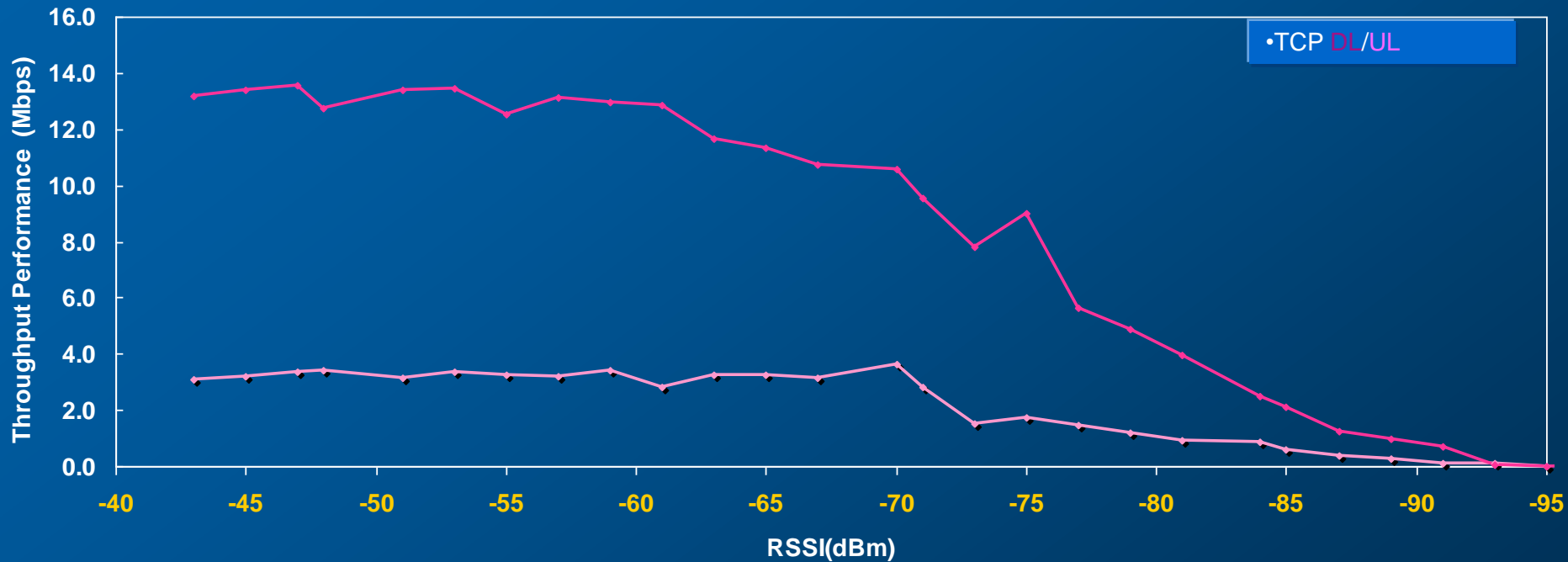
•Kilmer Peak Conductive Performance AWGN Low Correlation



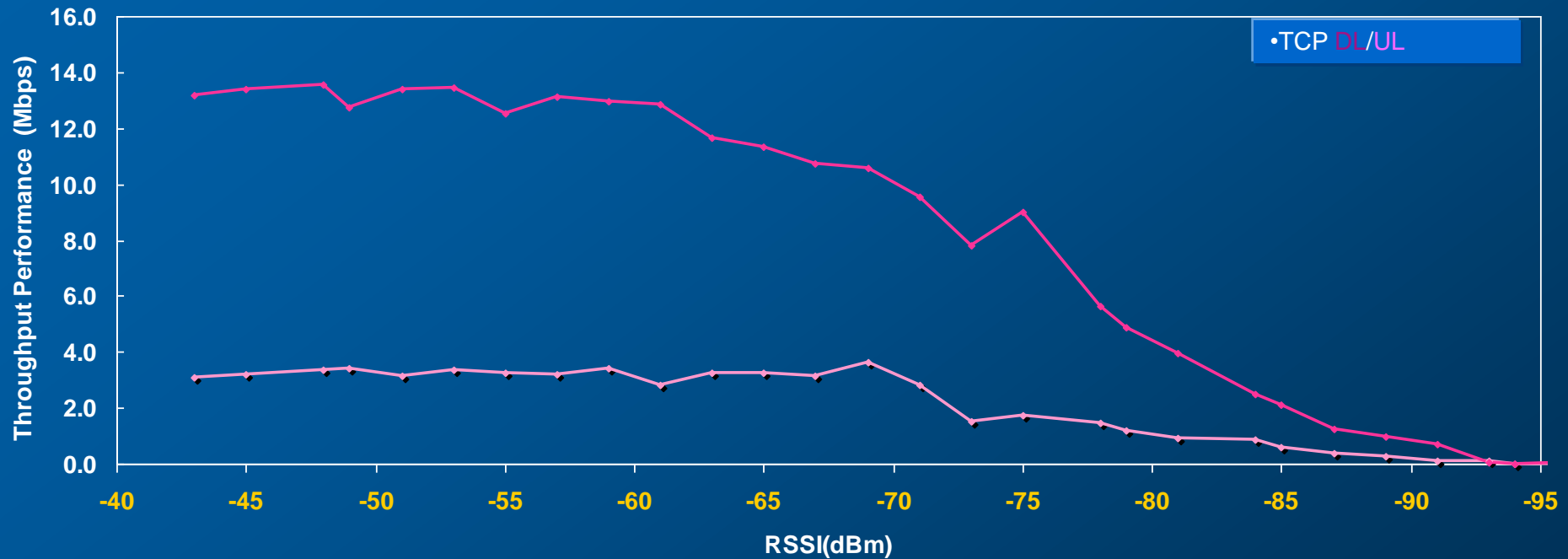
•Kilmer Peak Conductive Performance VehA 60km/h High Correlation



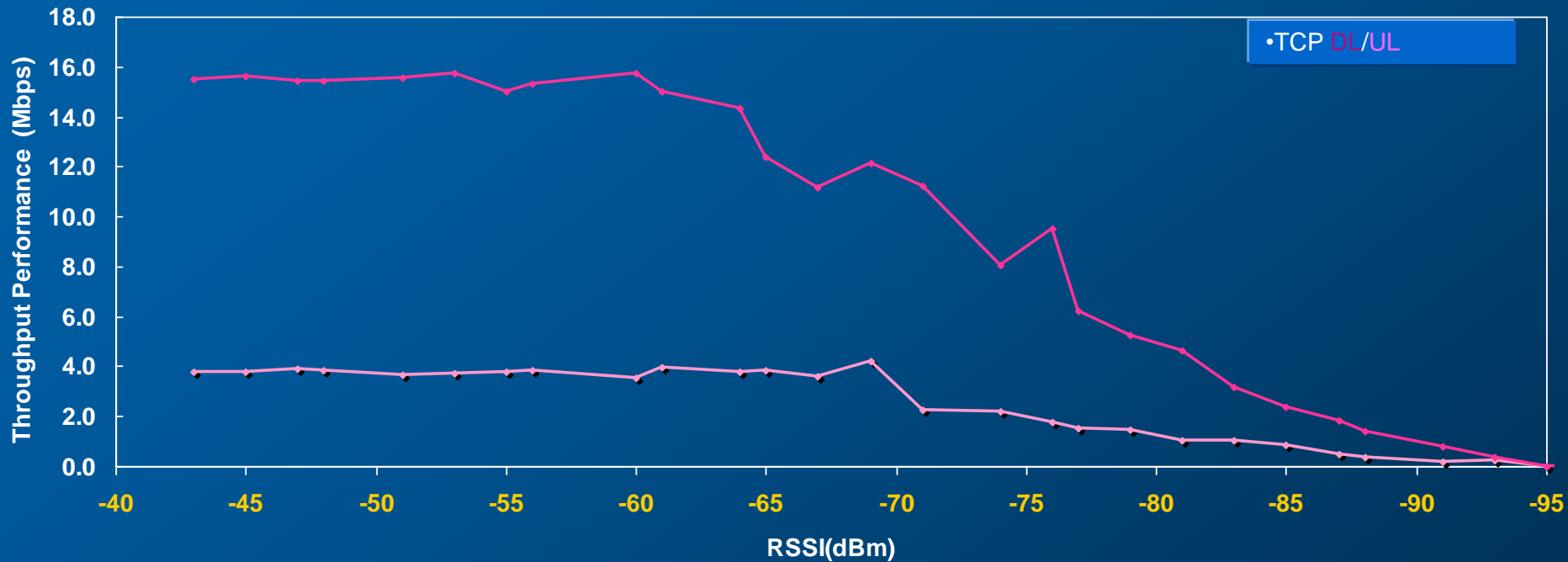
•Kilmer Peak Conductive Performance VehA 60km/h Low Correlation



•Kilmer Peak Conductive Performance PedB 3km/h High Correlation



•Kilmer Peak Conductive Performance PedB 3km/h Low Correlation



CPU Utilization Kilmer Peak v6.5

KP – v6.5.1035

June, 3 2011

Summery

Huron River

CPU usage was under the usability threshold for all states.

Calpella

CPU usage was under the usability threshold for all states.

Pinetrail

CPU usage was under the usability threshold for all states.

CPU Utilization Test Environment

- Test environment – conductive, ~70dB path loss
- Windows Performance Monitor (perfmon) is used to measure CPU Utilization.
- Iperf is used traffic generation.
- CPU Utilization short averages are measured over a period of at least 90 seconds.
- CPU Utilization Long averages are measured over a period of at least 8 hours.
- No system usage takes place other than the designated traffic type and the monitoring tool.
- All measurements are with Wi-Fi driver installed and not disabled.
- “Pessimistic approach” to CPU Utilization measurement is taken.
 - In addition to process CPU usage, total CPU usage is measured against baseline.
 - Baseline is a measurement of CPU Utilization prior to the installation of WiMAX drivers and applications.

CPU Utilization Values

<i>Value</i>	<i>Description</i>
Average	<p>Average CPU Utilization is the average as measured over a duration of at least 90 seconds. During the average measurement, no additional activity or applications are running beyond those necessary to capture the data and send/receive traffic.</p> <p>The services and applications running are the same as during the baseline.</p> <p>On platforms running an OEM OS image, additional active services or applications may be running based on OEM platform configuration.</p>
Peak	<p>Maximum CPU Utilization is measured over a duration of at least 3 minutes, or for the duration of the state if measuring Network Entry and Network Disconnect.</p> <p>This value represents the peak usage during that state. Total CPU usages above 80% can result in a noticeable lack of system responsiveness.</p>

CPU Utilization States

<i>State</i>	<i>Description</i>
Disconnected and Scanning	Average and Maximum CPU Utilization when device is on but not connected to the network, with periodic scanning taking place. Scan results will find at least one network is available during this test.
Network Entry*	Maximum CPU Utilization during Network Entry. Measured from the time the "Connect" button on the CU is activated to the time the device acquires an IP address and is able to ping successfully.
Idle	Average and Maximum CPU Utilization when device is connected but not sending/receiving network traffic. Measured over a period of 3-5 minutes, during which the device may enter an idle state.
Uplink Traffic	Average and Maximum CPU Utilization when the device is sending uplink traffic. Measured over a period of 3-5 minutes, using the maximum available throughput for traffic.
Downlink Traffic	Average and Maximum CPU Utilization when the device is sending downlink traffic. Measured over a period of 3-5 minutes, using the maximum available throughput for traffic.
Bi-Directional Traffic	Average and Maximum CPU Utilization when the device is sending both uplink and downlink traffic. Measured over a period of 3-5 minutes, using the maximum available throughput for traffic.

Huron River – Win7 64

Huron River SDP

Build - 6.5.1035

OS – Windows 7 64-bit

Card: Kelsey Peak SRA

Huron River – KsP – W64

Short Duration

	AppSvr Avg	AppSvr Peak	WiMAXCU Avg	WiMAXCU Peak	WiMAX Total Avg	WiMAX Total Peak
Idle	0.02	0.20	0.00	0.20	0.02	0.20
Disconnect	0.01	0.39	0.07	2.15	0.09	2.15
UL Traffic	0.00	0.00	0.00	0.00	0.11	0.11
DL Traffic	0.20	0.59	0.02	0.20	0.37	0.74
Bidirectional	0.03	0.39	0.00	0.00	0.21	0.56
Network Entry	0.02	0.59	0.08	1.95	0.11	2.54

•*Other brands and names are the property of their respective owners.

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Calpella – Win7 32

Calpella SDP

Build - 6.5.1035

OS – Windows 7 32-bit

Card: Kilmer Peak QS Volume

Calpella– KP – W32

Short Duration

	AppSvr Avg	AppSvr Peak	WiMAXCU Avg	WiMAXCU Peak	WiMAX Total Avg	WiMAX Total Peak
Idle	0.04	0.78	0.04	1.95	0.08	1.95
Disconnect	0.01	0.39	0.14	3.91	0.16	4.69
UL Traffic	0.01	0.39	0.03	0.78	0.17	1.31
DL Traffic	0.14	1.56	0.08	1.95	0.29	2.81
Bidirectional	0.08	0.78	0.05	1.17	0.34	1.77
Network Entry	0.05	0.78	0.49	5.08	0.59	5.48

•*Other brands and names are the property of their respective owners.

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PineTrail– XP 32

Pinetrail SDP

Build - 6.5.1035

OS – XP 32-bit

Card: Kelsey Peak SRA

Pinetrail– KsP – X32

Short Duration

	AppSvr Avg	AppSvr Peak	WiMAXCU Avg	WiMAXCU Peak	WiMAX Total Avg	WiMAX Total Peak
Idle	0.02	2.34	0.10	3.13	0.12	3.13
Disconnect	0.07	3.91	0.55	13.28	0.62	17.19
UL Traffic	0.00	0.00	0.00	0.00	0.43	0.43
DL Traffic	0.00	0.00	0.03	1.52	0.87	2.36
Bidirectional	0.00	0.00	0.04	1.56	0.79	2.31
Network Entry	0.07	5.47	0.54	14.06	0.61	19.53

•*Other brands and names are the property of their respective owners.

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